

Research Review & Advisory Committee (RRAC) Meeting

April 29, 2018

Environmental Health Staff
Disease Control and Health Protection
Bureau of Environmental Health
Onsite Sewage Programs

Agenda (estimated times)

1:00 – 1:10 pm	Introductions and housekeeping
1:10 – 1:20 pm	Review of minutes from December 10, 2018 meeting
1:20 – 1:30 pm	Old business & research program news
1:30 – 1:50 pm	Elect new chair
1:50 – 2:20 pm	Draft monitoring plan for in-ground nitrogen-reducing biofilter
2:20 – 2:40 pm	RRAC members and public provide comments on the monitoring project

Agenda - Continued

2:40 – 2:55 pm	Update on proposed legislation impacting the Onsite Sewage Program
2:55 – 3:20 pm	Update on the Florida Water Management Inventory project
3:20 – 3:30 pm	Update on onsite sewage system funding research
3:30 – 3:45 pm	Update on the continued monitoring project
3:45 – 4:00 pm	Public comments
4:00 pm	Adjourn

Introductions & Housekeeping

- Committee roll call
- Identification of audience
- Mute / unmute phone line = *2
- Do not put phone on hold
- Download meeting material:

[http://www.floridahealth.gov/environmental-health/
onsite-sewage/research/rrac.html](http://www.floridahealth.gov/environmental-health/onsite-sewage/research/rrac.html)

Review of Meeting Minutes from December 10, 2018 Meeting

Old Business & Research Program News

Old Business

Action items from the RRAC meeting on December 10, 2018

1. Elect a new chair for the committee. Sending an email to all RRAC members and get names of whoever is interested in the chair position
2. Continue with high priority research projects.
3. Update memberships for several RRAC members.
4. Post meeting materials used for December 10 meeting onto DOH's RRAC web page.
5. Find out to whom the "Letter to home builders regarding OSTDS permitting" was sent to the Florida Home Builder's Association.

Elect A New Chair

Discussed during the RRAC meeting on December 10, 2018

1. Mr. Bob Himschoot volunteered to be the new chair.
2. Ms. Roxanne Groover also volunteered to be the new chair.
3. Because Mr. Bill Melton (vice chair) was not at the meeting, RRAC decided to decide during the next meeting.
4. Make a decision today.

Continue with High Priority Research Projects

Project Title	Total Project Score	Project Ranking
Continuation of Florida Water Management Inventory	28	1
Continued Monitoring of Passive Nitrogen-Reducing Onsite Systems	28	2
Development of Funding Mechanisms for OSTDS Remediation and Upgrades	26	3
Correlations between water quality, OSTDS, and health effects	14	4
Estimation of failure or non-conformance rates of OSTDS	10	5

Membership Update

1. Memberships for the following professional groups have been updated:
 - a) Home Building Industry (Florida Home Builders Association)
 - b) Professional Engineer (Florida Engineering Society)
 - c) Real Estate Profession (Florida Association of Realtors)

Membership Update - Continued

2. Appointment letters have been sent to:

- Mr. Bob Himschoot (Primary member). Alternate member vacant.
- Dr. Mark Tumeo (Primary member). Mr. Clay Tappan (Alternate member)
- Mr. Eric Rolling (Primary member). Mr. Thomas Baker (Alternate member)

3. Updated membership list posted at:

http://www.floridahealth.gov/environmental-health/onsite-sewage/research/_documents/rrac-members_20190206.pdf.

Meeting Materials for the December 10, 2018 Meeting Posted:

<http://www.floridahealth.gov/environmental-health/onsite-sewage/research/rrac.html>

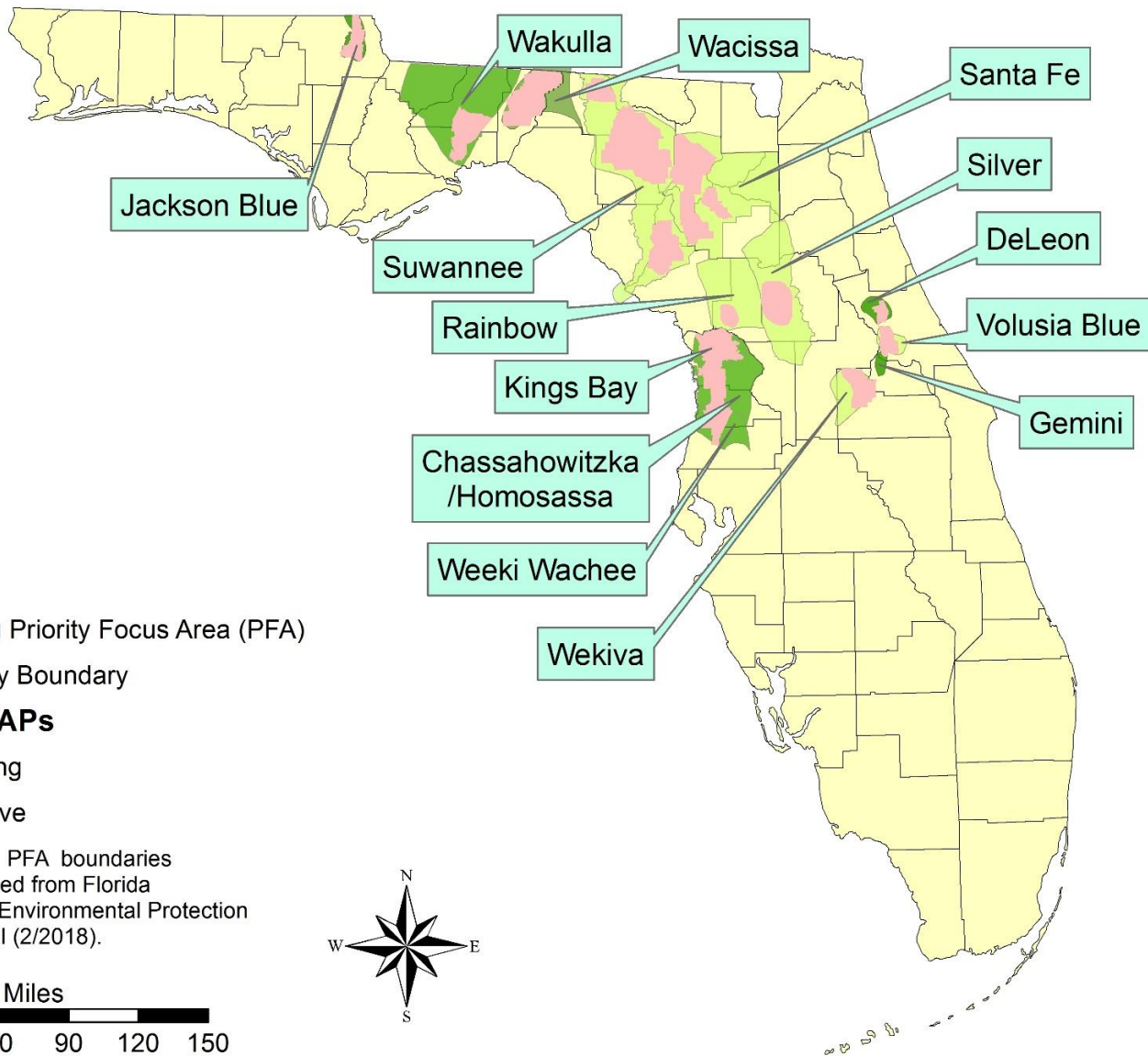
To whom the “Letter to home builders regarding OSTDS permitting” was sent to the Florida Home Builder’s Association

1. The letter was sent to Mr. Doug Buck, director of Government Affairs for the Florida Home Builders Association.
2. An email was sent to Mr. Bob Himschoot on December 19, 2018 about this finding.

Elect a New Chair



Establish a Monitoring Project for In-Ground Nitrogen-Reducing Biofilters (INRB)



N



Spring Priority Focus Area (PFA)

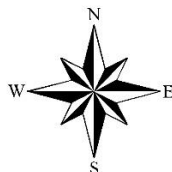
County Boundary

Spring BMAPs

Pending

Effective

The BMAP and PFA boundaries were downloaded from Florida Department of Environmental Protection GIS Data Portal (2/2018).



Miles



Nitrogen-Reducing Treatment System Options

Overall Goal of Nitrogen Removal: $\geq 65\%$

Nitrogen-reducing
Aerobic Treatment
Units

- Certified to meet National Sanitation Foundation (NSF) Standards 40 and 245
- Require operating permit (OP), maintenance entity (ME) and maintenance contract agreement (MCA)

Performance-based
Treatment Systems

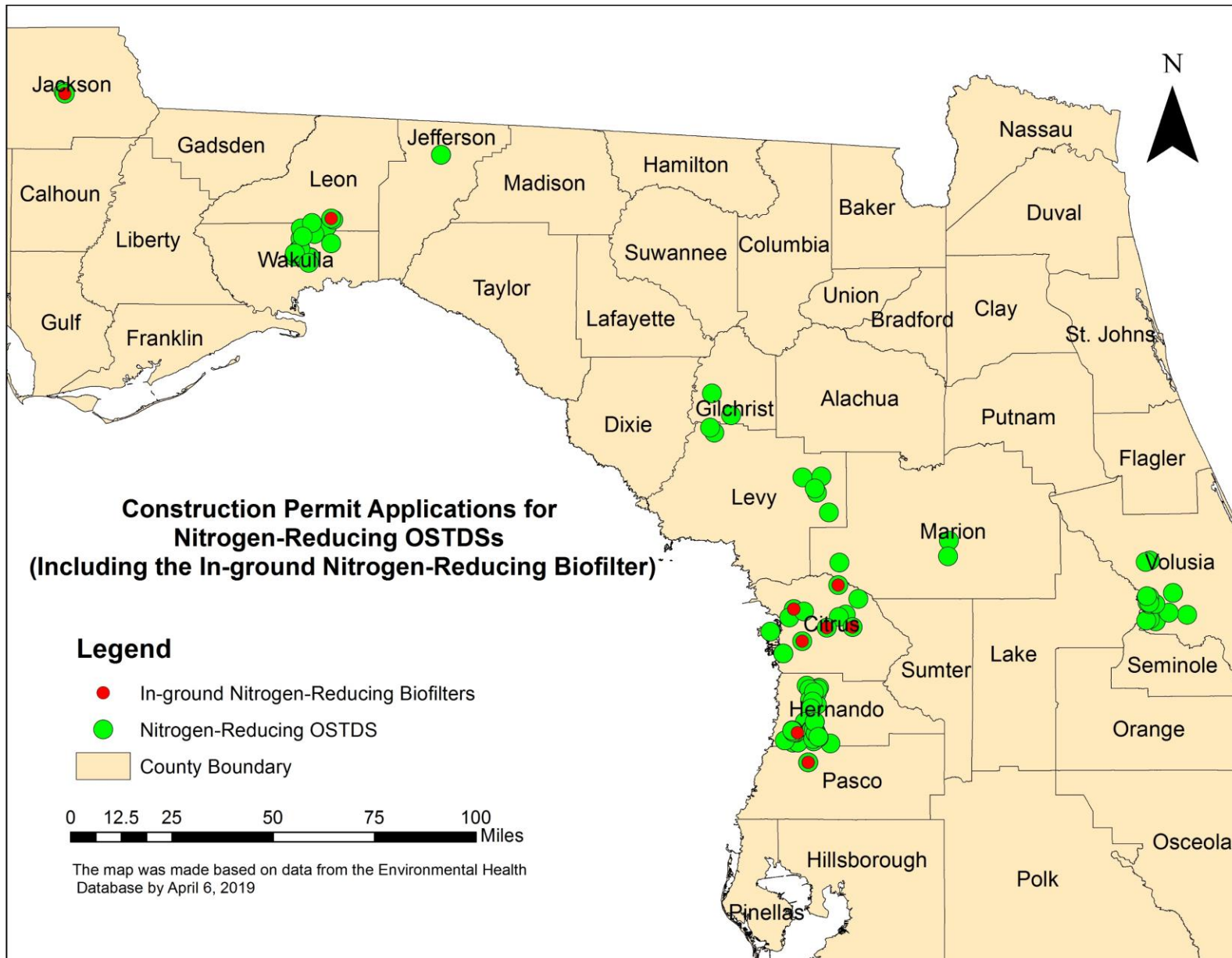
- Must be designed by Florida Professional Engineer
- Require OP, ME and MCA

In-ground Nitrogen-
Reducing Biofilter
(INRB) stacked under
a conventional
drainfield

- No engineer design should be needed unless lot conditions require
- No OP, ME or MCA needed

Construction Permit Applications for Nitrogen-Reducing Systems by 04/06/2019

County	Number of INRB Permits	Total Number of Nitrogen-Reducing OSTDSs
Citrus	5	12
Gilchrist		1
Hernando	1	45
Jackson	1	2
Jefferson		2
Leon	1	2
Levy		8
Marion		3
Pasco	2	2
Volusia		16
Wakulla		19
Total	10	113

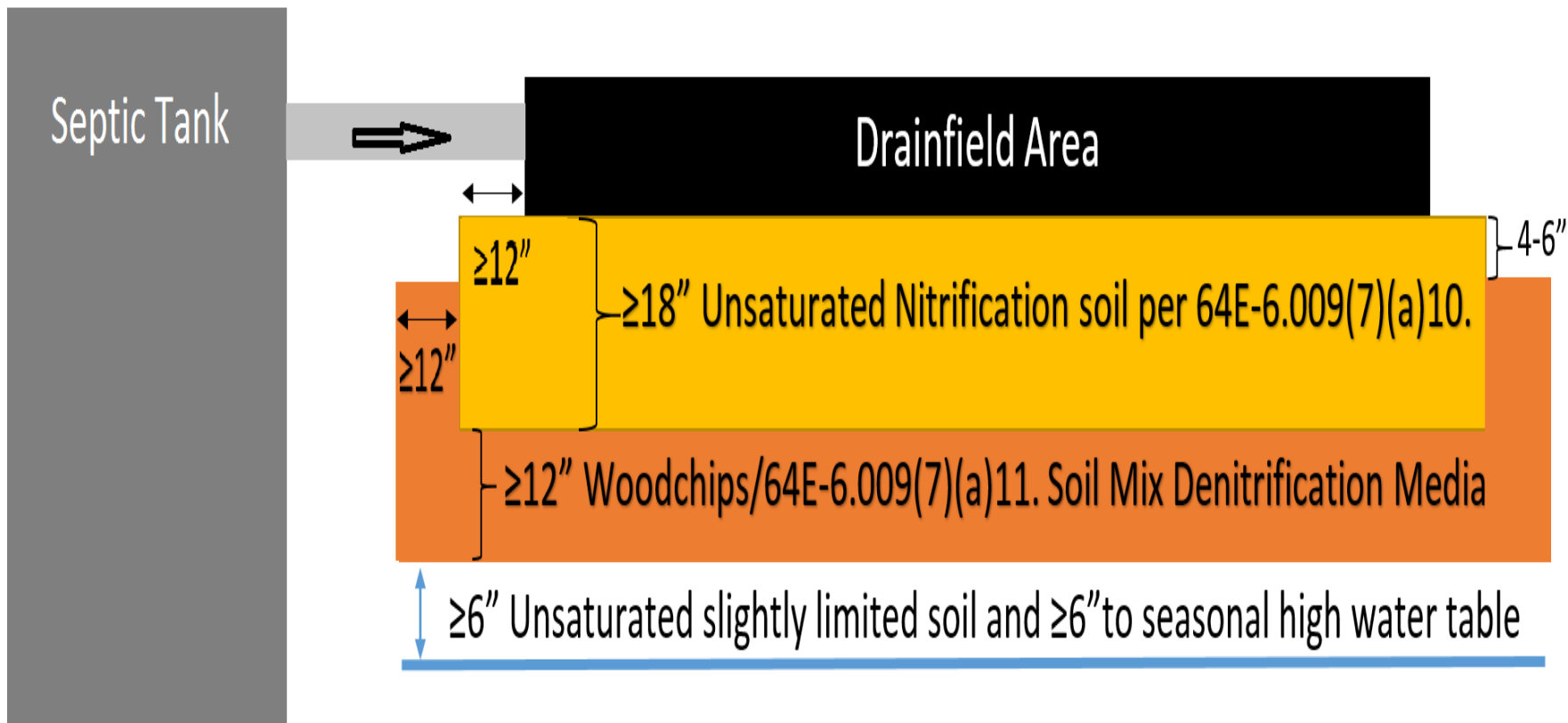


Need to Establish a Monitoring Project for INRB

1. Applications for INRB are accumulating.
2. There is interest by a variety of stakeholder groups in the performance of INRBs.

Goals of Monitoring Project

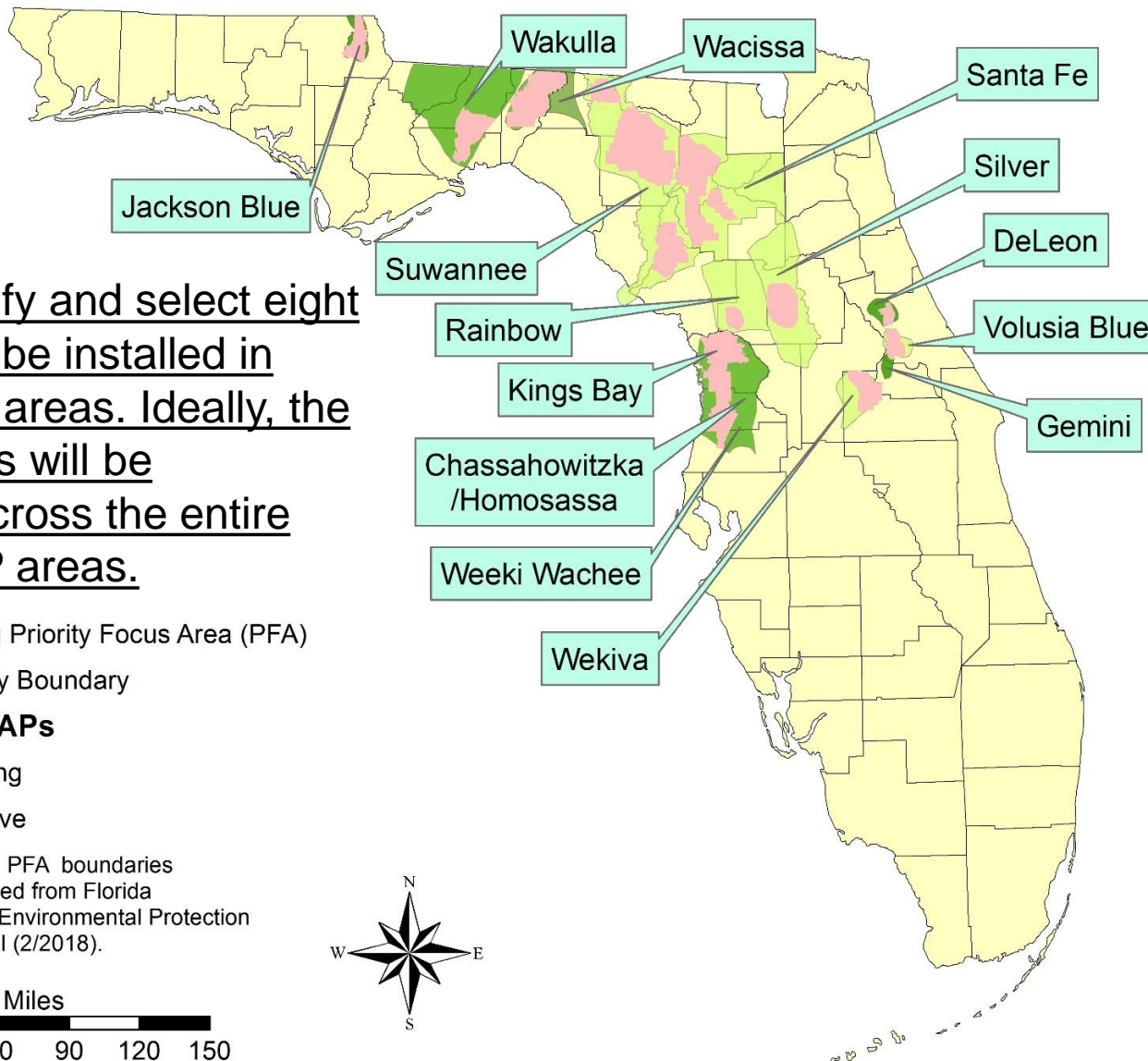
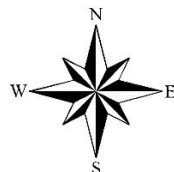
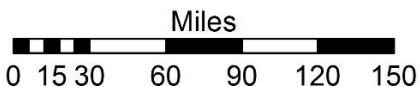
1. What is the INRB nitrogen-removal effectiveness in various installations?
2. Evaluate how reliably INRB can achieve the minimum 65% nitrogen-removal effectiveness goal.
3. Evaluate INRB's phosphorous-removal effectiveness.
4. Evaluate the factors that may influence the nutrient-removal effectiveness.
5. Document system installation and maintenance effort and costs.
6. Possibly evaluate rate of organic carbon decomposition.

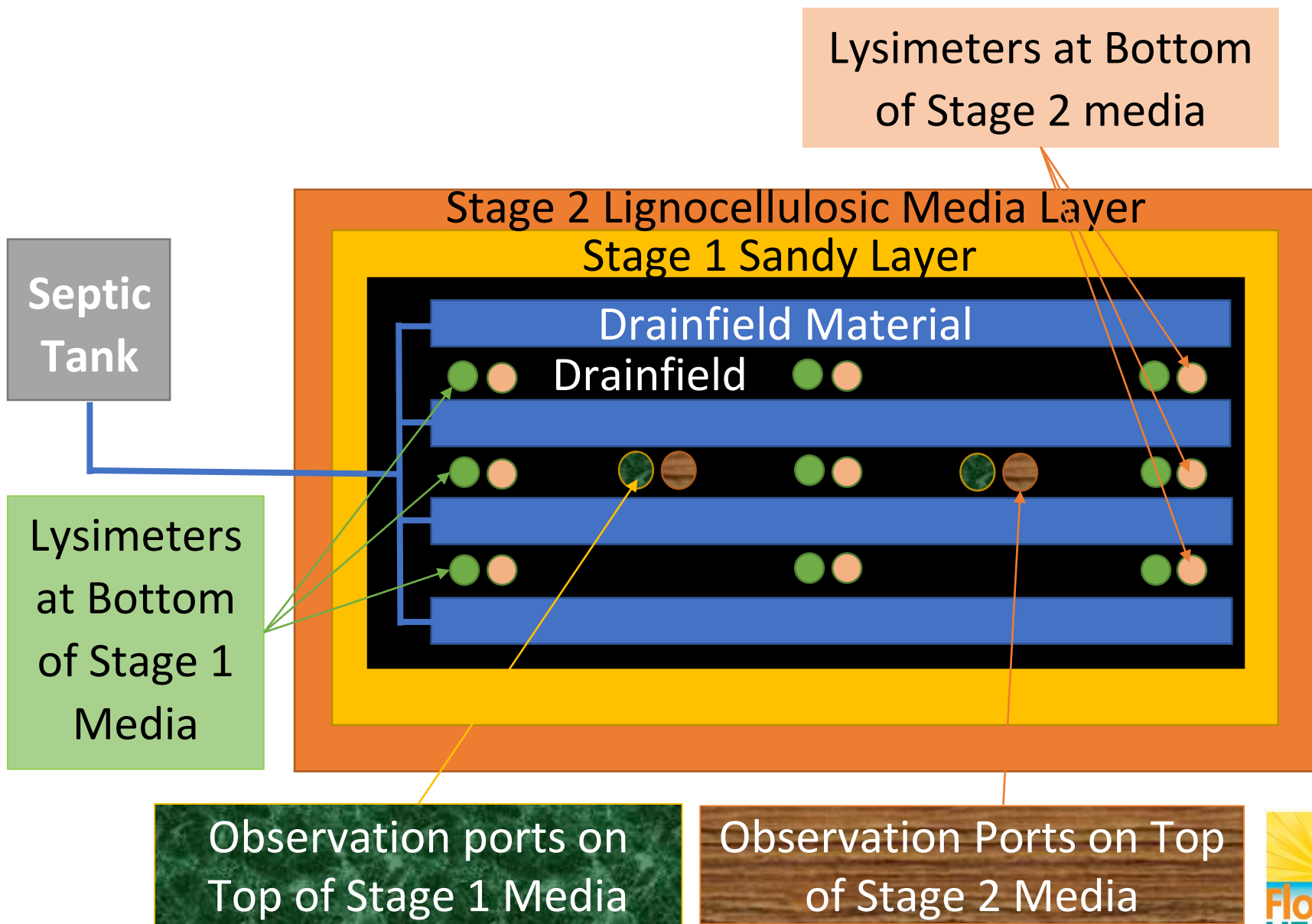


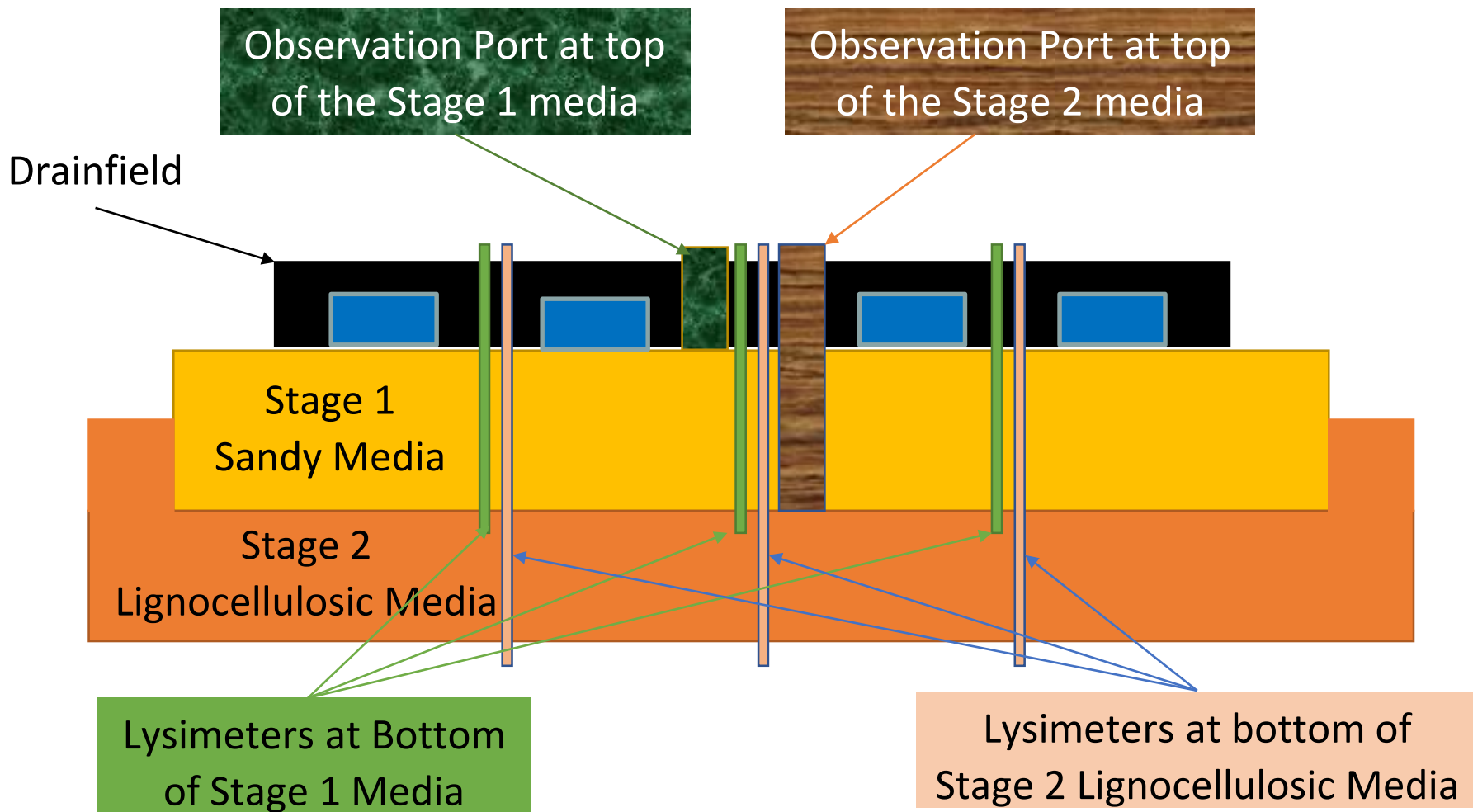
Plan to identify and select eight (8) INRBs to be installed in these BMAP areas. Ideally, the eight systems will be distributed across the entire spring BMAP areas.

- Spring Priority Focus Area (PFA)
- County Boundary
- Spring BMAPs**
- Pending
- Effective

The BMAP and PFA boundaries were downloaded from Florida Department of Environmental Protection GIS Data Portal (2/2018).







Monitoring Locations

1. Septic tank effluent.
2. Stage 1 media effluent (proximal, middle, and distal portions of the drainfield).
3. Stage 2 media effluent (proximal, middle, and distal portions of the drainfield).

Monitoring Chemical Parameters

1. Total Kjeldahl Nitrogen (TKN).
2. Ammonium.
3. Nitrate/Nitrite.
4. Total Nitrogen.
5. Total Phosphorus.
6. Total Organic Carbon.
7. Alkalinity (low priority).
8. Chloride (optional).



Monitoring Field Parameters

1. Water Temperature.
2. Dissolved Oxygen.
3. Specific Conductivity.
4. pH.
5. Oxidation-Reduction Potential.



System Survey

1. Elevation of Finished Grade.
2. Elevation of Infiltration Surface/Top of Stage 1 Media.
3. Elevation of Bottom of Stage 1 Media/Top of Stage 2 Media.



Document Weather Conditions for the Period of Monitoring

1. Antecedent 7-day, monthly and annual total rainfall.
2. Antecedent 7-day , monthly and annual average air temperature.
3. Antecedent 7-day, monthly and annual average evaporation rate.



Sampling Frequency and Duration



1. All systems will be sampled quarterly.
2. Each system will be sampled for eight consecutive quarters.

Document Drainfield and INRB Structure

1. Installation costs.
2. Drainfield size.
3. Drainfield type.
 - Trench or bed
 - Subsurface, fill, or mound
 - Gravity or pressure dosing
4. Stage 2 Lignocellulosic material size distribution
5. Stage 2 fine aggregate texture



Installation and Use of INRB

1. Overall system assessment.
2. Maintenance efforts and costs.
3. Household water use (maybe flow to drainfield if possible).

Evaluate INRB's Nitrogen-Removal Effectiveness

1. Nitrogen-removal effectiveness will be estimated using the following equation:

$$N_r = \frac{N_{influent} - N_{effluent}}{N_{influent}}$$

Where,

N_r is nitrogen-removal effectiveness

$N_{influent}$ is the total nitrogen concentration in influent

$N_{effluent}$ is the total nitrogen concentration in effluent.

Evaluate INRB's Nitrogen-Removal Effectiveness – Continued

Proposed method to assess system compliance with the design target (minimum 65% for installation median nitrogen-removal effectiveness, minimum 50% for event samples):

1. For each INRB installation, the median N_r of the eight quarterly samples needs to be larger than 65%.
2. Among the eight INRBs monitored, median N_r of at least six systems needs to be equal to or higher than 65%. This provides 90% confidence that the percent INRBs in compliance with the design target is significantly higher than 50%.

Evaluate INRB's Nitrogen-Removal Effectiveness – Continued

3. When pooling individual event monitoring results from all eight INRB installations together, out of the total 64 N_r , at least 54 should be equal to or higher than the minimum event target value. This will provide 90% confidence that the fraction of event results meeting the 50% nitrogen-removal target is significantly higher than 75%.

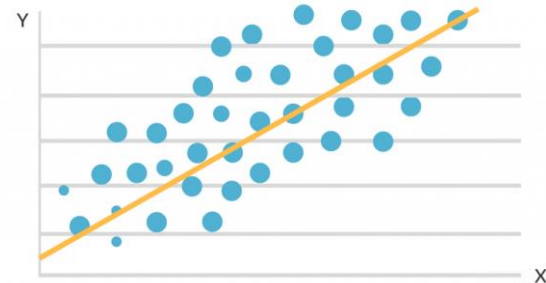
Note: Minimum target value for events is calculated as the average between nitrogen-removal effectiveness of a conventional system (35%) and the target of 65%.

Estimating Possible Lignocellulosic Decomposition

1. If subsidence of the system is observed, identify which drainfield layer causes the system subsidence:
 - a) Drainfield layer (elevation difference between the finished grade and infiltration surface)
 - b) Stage 1 media layer (elevation difference between the infiltration surface and the bottom of the Stage 1 media)
 - c) Stage 2 media layer (elevation difference between the bottom of the Stage 1 media and bottom of the Stage 2 media).
2. If the subsidence is mainly caused by the change of 1 c), the change of the lignocellulosic media volume will be calculated and be used as an estimation of loss of lignocellulosic media.

Possible Factors Influencing the Nitrogen-Removal Effectiveness

1. Weather conditions (air temperature, rainfall, and evaporation).
2. Water table separation (piezometer measurements).
3. Dissolved oxygen concentration in the lignocellulosic layer.
4. Hydraulic loading and wastewater strength.
5. Drainfield structure (size, type, and waster distribution).
6. System usage – dormant time.



Project Cost Estimate

1. Expected Project duration: Four years from late 2019 to late 2024.
2. Total project cost is about \$300,000, covering:
 - a) Monitoring equipment and installation.
 - b) Supply purchase.
 - c) Sample collection travel and staff time.
 - d) Laboratory analyses of collected samples.
 - e) Reports preparation.
3. Now applying for \$180,000 319 grant support.
4. Require \$120,000 DOH match (in-kind salary match and Onsite Sewage Research Fund).



Onsite Sewage Program Research Fund

1. Balance at the beginning of FY 2018-2019: \$212,485
2. Year-to-date revenue: \$97,779 (by 4/8/2019).
3. Annual revenue:
 - a) 2016-2017: \$87,417.
 - b) 2017-2018: \$102,614.
 - c) 2018-2019 (expected): \$123,000.

Onsite Sewage Program Research Fund - Continued

4. Year-to-date net expenditure: \$242
 - a) Continued monitoring project is mostly funded by general onsite sewage program fund and 319 Grant.
 - b) Florida Water Management Inventory is currently funded by several federal grants.
5. Balance by 4/8/2019: \$310,022
6. Proposed expenditure on the INRB monitoring project: average \$40,000/year for the first three years.

Updates on Proposed Legislation

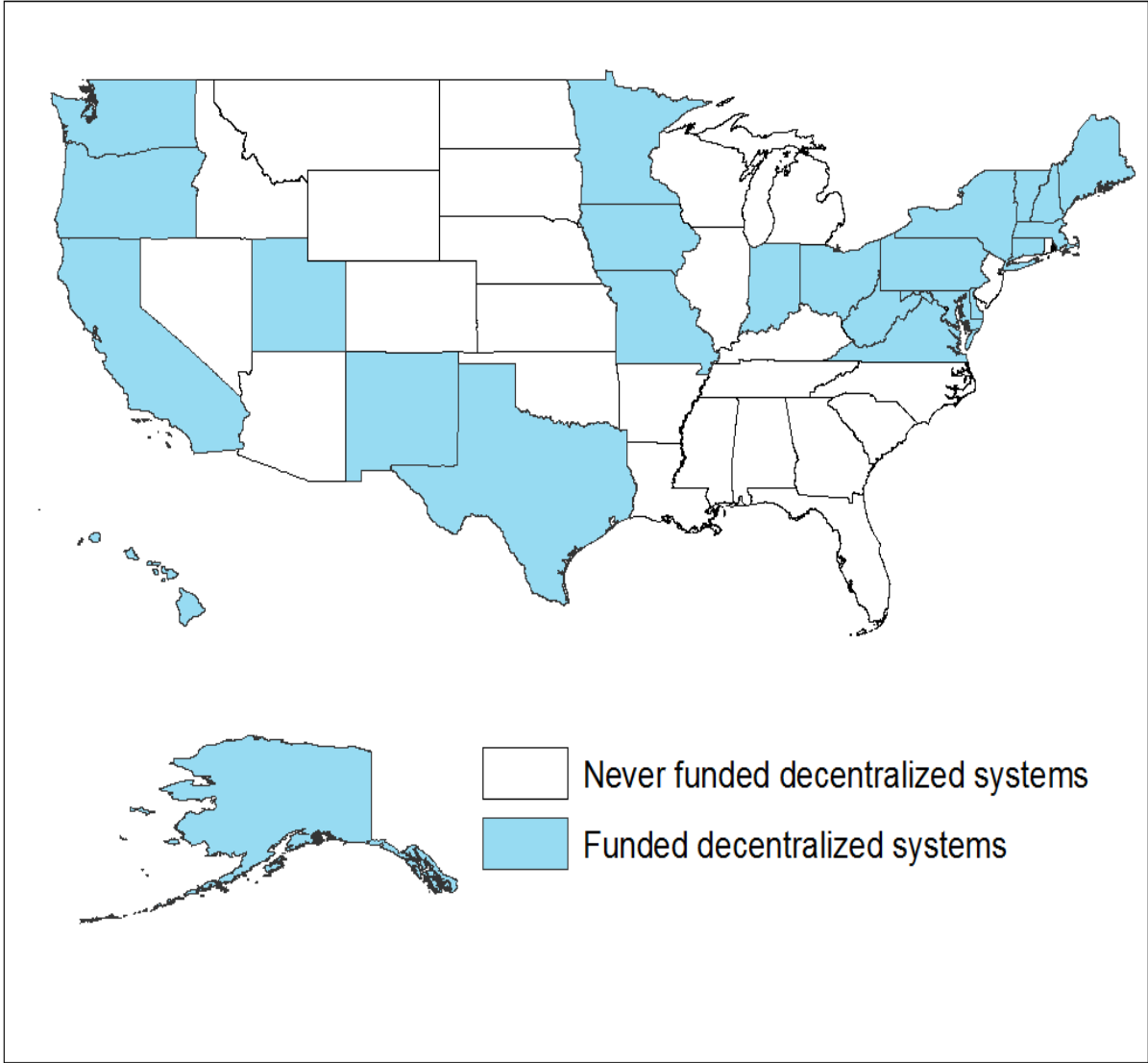
Updates on the Florida Water Management Inventory (FLWMI) Project



Updates on the OSTDS Funding Investigation

Identified OSTDS Funding Sources

- Florida Springs Protection Fund.
- Septic Upgrade Incentive Program Fund.
- State Housing Initiative Program Fund.
- U.S. Environmental Protection Agency (EPA) Clean Water State Revolving Fund (CWSRF, a.k.a. SRF).
- EPA Nonpoint Source Section 319 Grants.
- U.S. Department of Agriculture, Rural Development Housing Program – Single Family Housing.
- U.S. Department of Housing and Urban Development through Florida Department of Economic Opportunity.



CWSRF funded decentralized systems in 24 of 50 states.

Funding Disbursement Approaches (from the perspective of an entity that provides funding)

- Direct lending
- Linked deposit
- Pass-through funding



Florida CWSRF

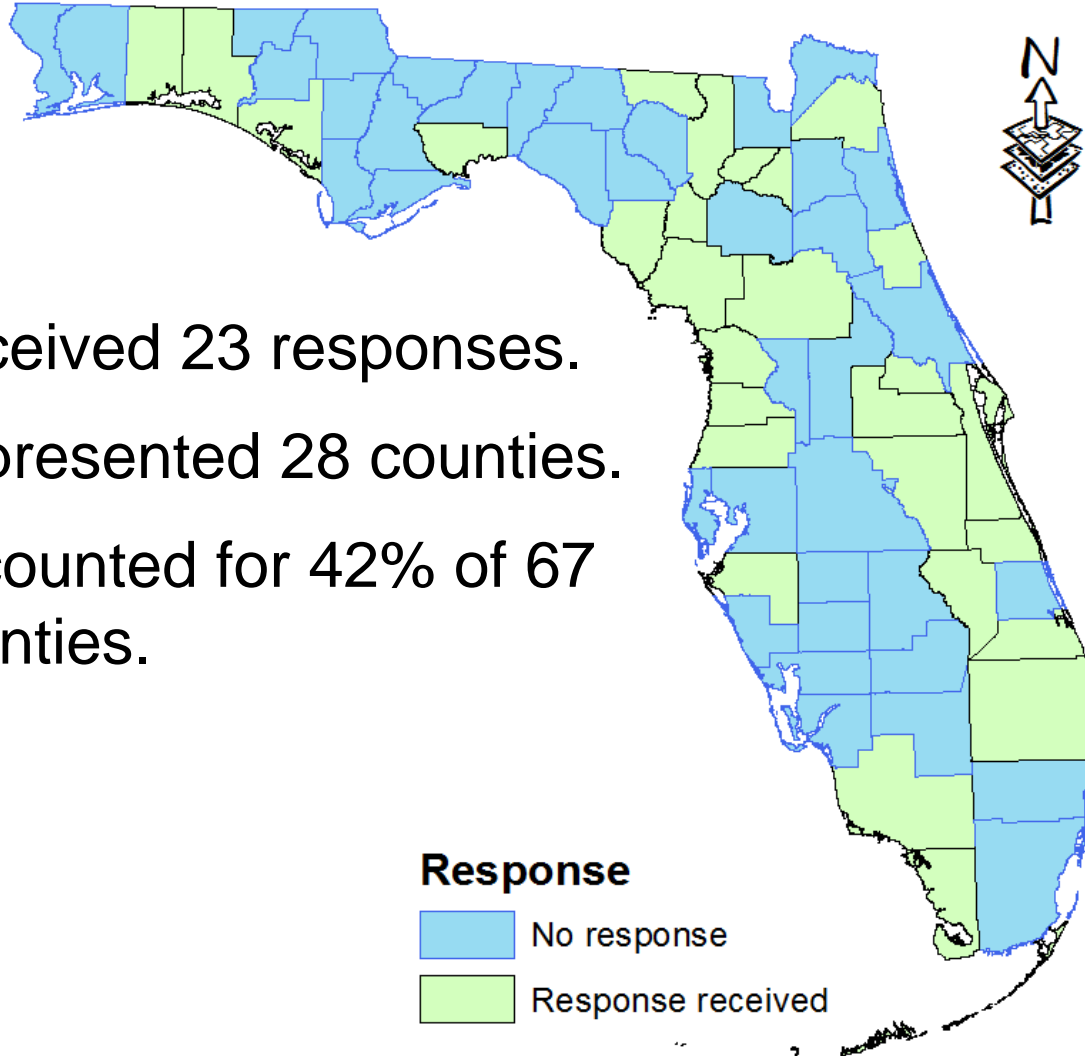
1. Primarily funded wastewater treatment plans and stormwater projects so far.
2. OSTDS funding not implemented but eligible.
3. Distributing CWSRF directly from DEP to homeowners not feasible because of the workload and DEP staffing.
4. DEP prefers the pass-through funding mechanism using local governments or third party entities as the funding management and distribution entities.
5. No county governments showed willingness to be the funding management and distribution entities.

OSP-Survey of EH-directors in 67 County Health Departments

1. Whether there are strong needs for financial assistance to support OSTDS repairs and modifications.
2. How OSTDS failures are addressed without sufficient funding support.
3. Whether there lenders available in local area to provide funding, and, if yes, who are they?
4. If no lenders are locally available, whether there are discussions of establishing local funding mechanisms.
5. What entities in local areas may be able to manage a loan fund from DEP and dispense money to homeowners.
6. What are major challenges for local jurisdictions to become or establish such entities.

Responses Received

1. Received 23 responses.
2. Represented 28 counties.
3. Accounted for 42% of 67 counties.



Results from the Survey

1. About 60% of the responses indicated strong needs of financial support for OSTDS management.
2. Available state and local funding for OSTDS is insufficient. Loan availability to OSTDS is also limited.
3. About 50% of the responses indicated that the State Housing Initiative Partnership (SHIP) program managed by county housing departments can be a potential candidate to function as CWSRF management and distribution entity.
4. DEP CWSRF program does not have any problem using SHIP as a vessel.
5. Florida Housing Finance Corporation – the SHIP program administrator.

Effort from Florida Onsite Wastewater Association (FOWA)

FOWA is working on a proposal to become a utility type of entity that manages OSTDS fund from DEP.

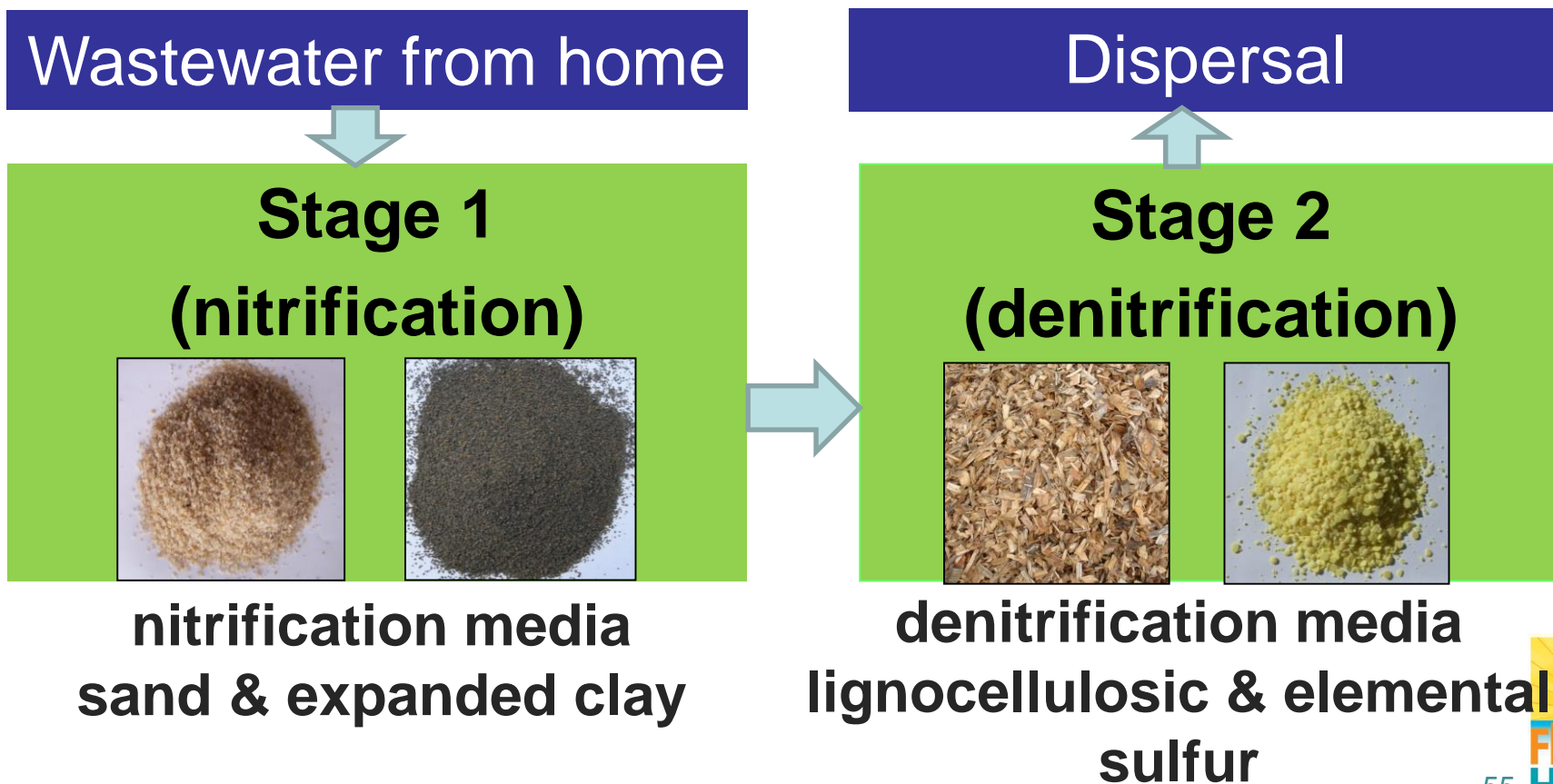
Next Steps for the Project

1. Wrap up the project.
2. Prepare a written summary of the findings.
3. Possibly: Prepare some education materials for county health departments, OSTDS industry, and homeowners:
 - a) a written summary introducing the available funding sources for OSTDS.
 - b) website links to various funding programs.

Updates on the Continued Monitoring

“Passive” Nitrogen Reduction Systems (PNRS)

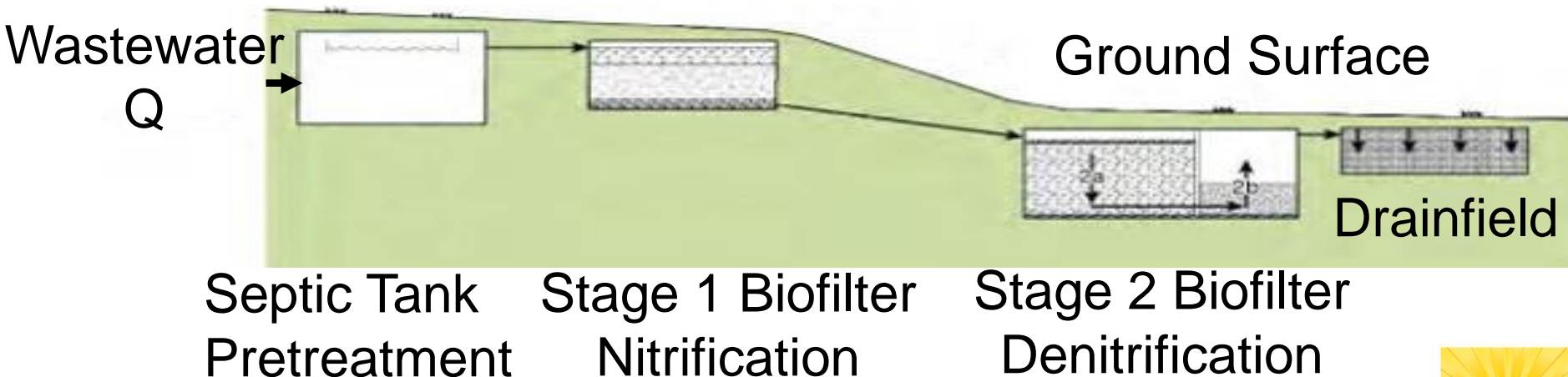
Reduce effluent N using reactive media for denitrification and a single liquid pump, if necessary.



In-Tank PNRS



In-Tank Two Stage Biofilter with Stage 1, Dual Media Stage 2 Lignocellulosic (2a) followed by Elemental Sulfur (2b).

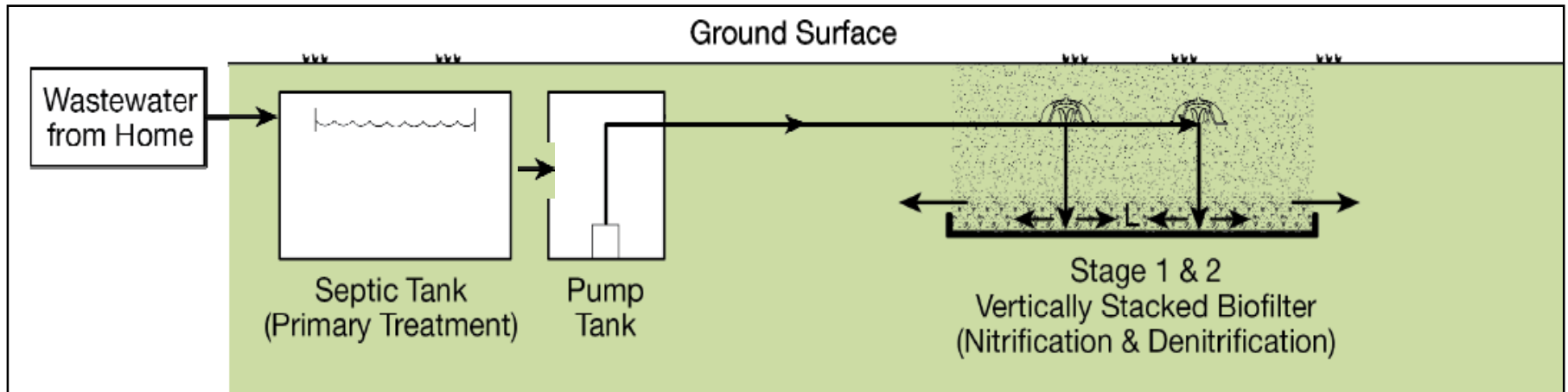


Note: In flat landscapes may need up to a single pump.

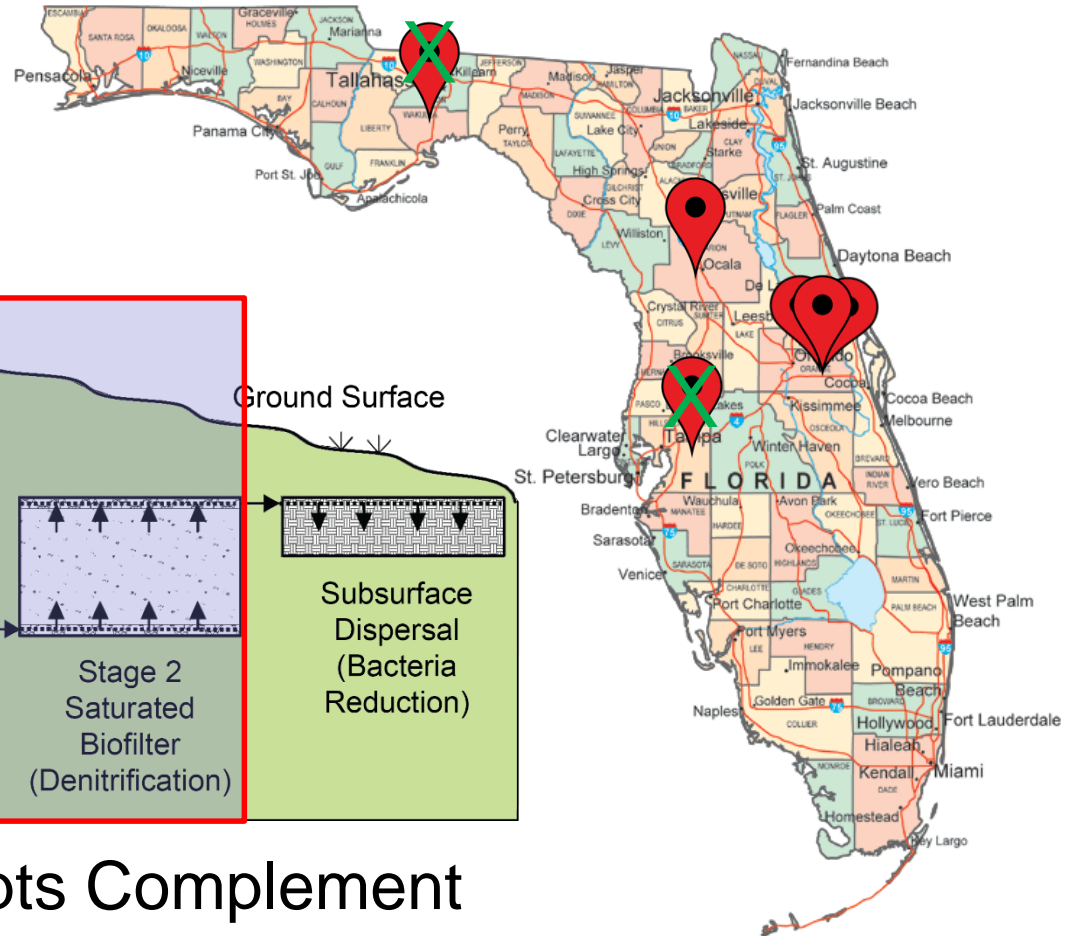
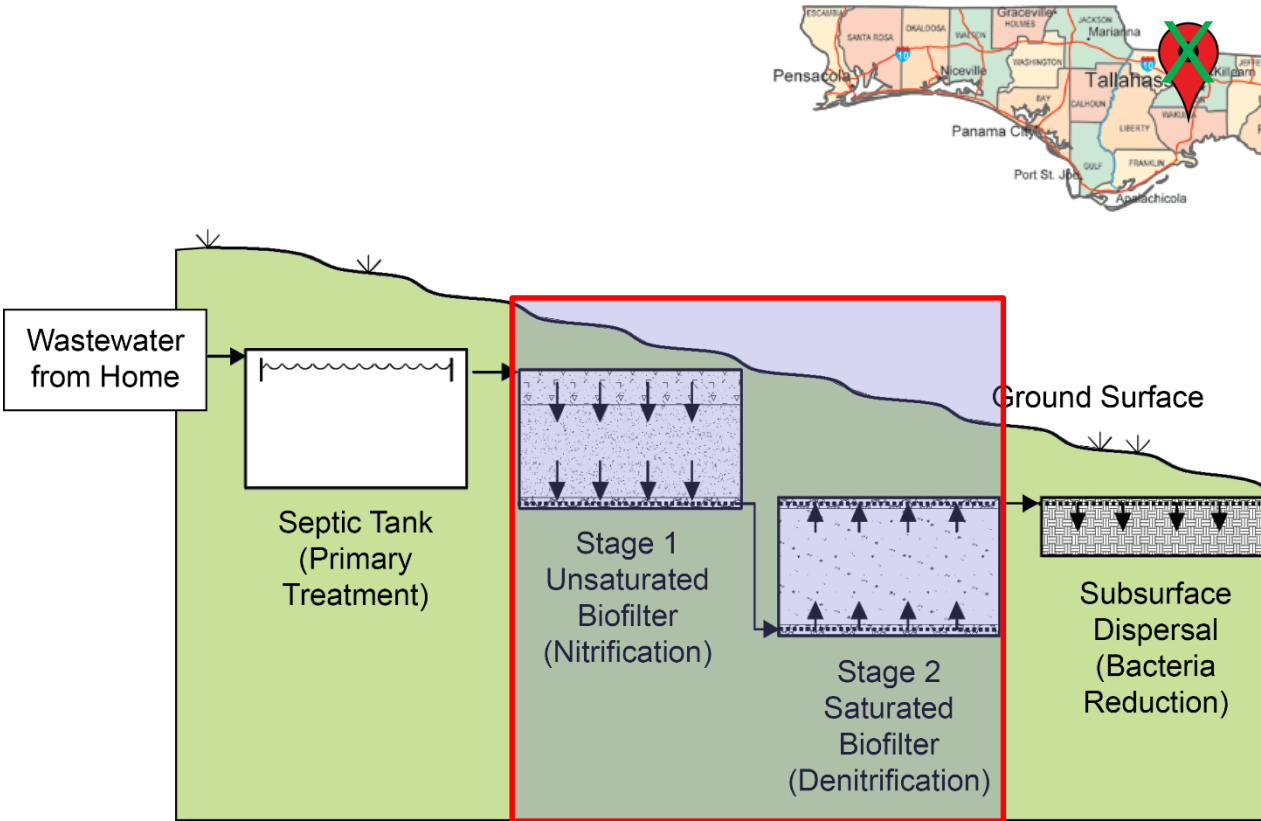
In-Ground Passive Nitrogen System



Conventional OSTDS + In-Ground Two Stage System: Stage 1 Sand, and Stage 2 Lignocellulosic Materials



Nitrogen Reduction at Field Sites



Full Scale Concepts Complement Existing Septic Systems

Goals of the Monitoring Project

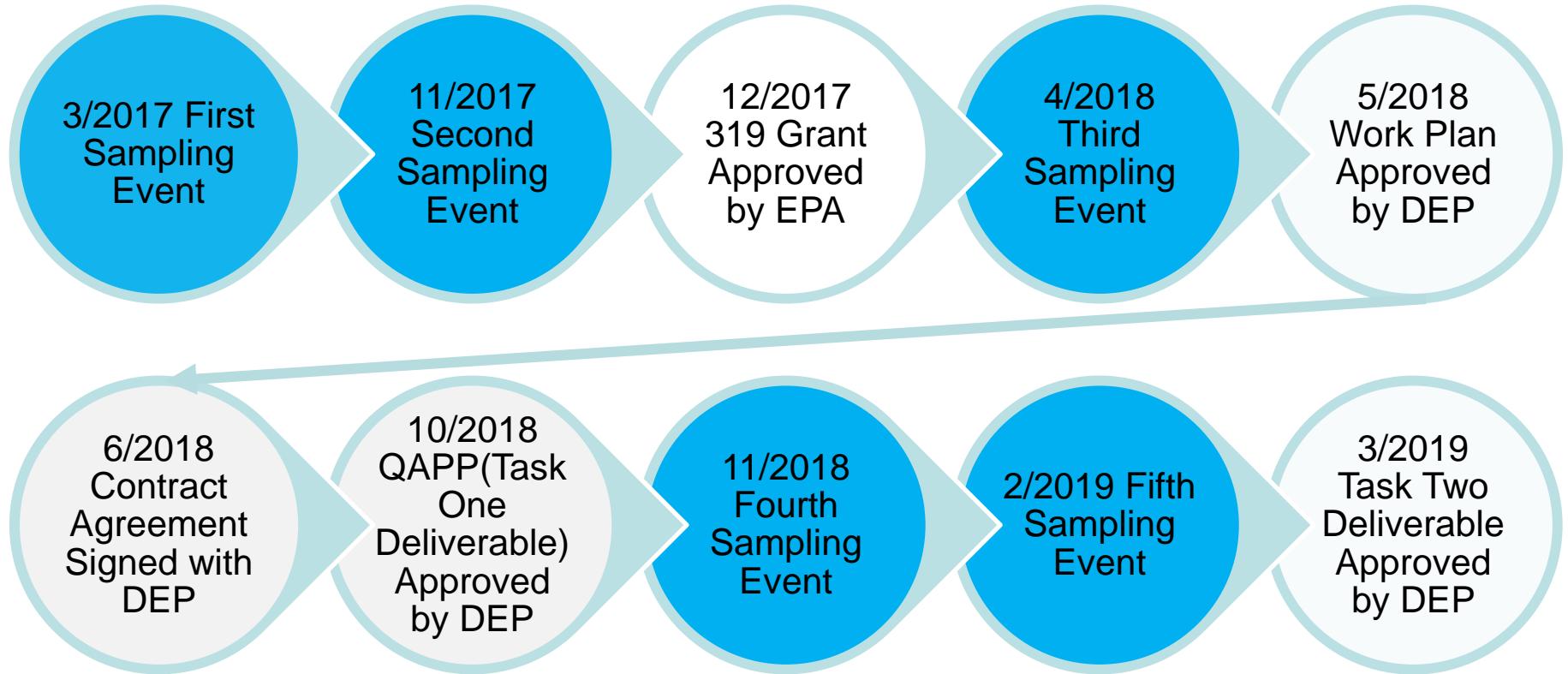
Goals

- Establish long-term performance of the two-stage passive nitrogen removal technology
- Provide guidance for possible system refinement and future implementation
- Monitor operation and maintenance requirements

EPA 319 Grant Support

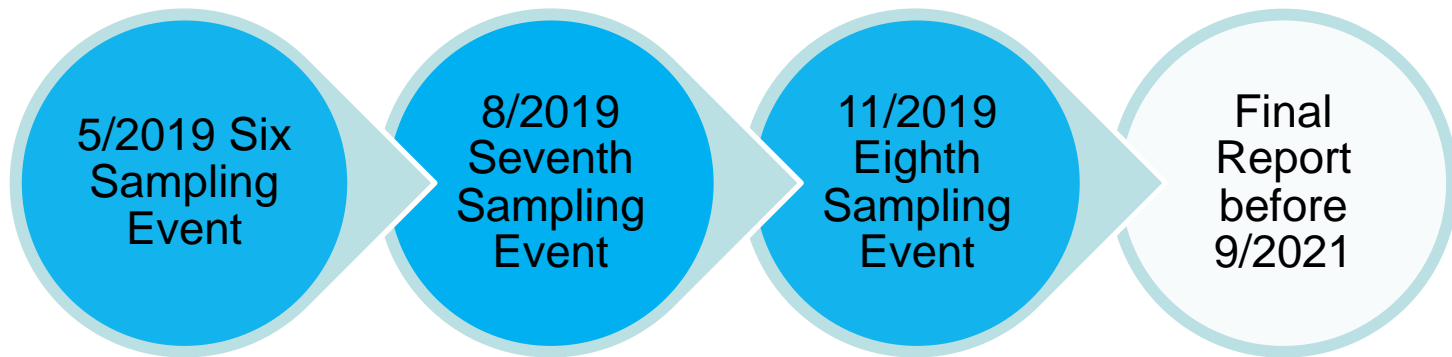
1. The continued monitoring project is funded with \$72,000 319 Grant fund and \$48,000 DOH match. The grant agreement started in June 2018 and will end in September 2021.
2. The four systems will be sampled quarterly eight times.
3. Five sampling events have been completed.
4. All sampling events will be finished in 2019.

Continued Monitoring Time Line

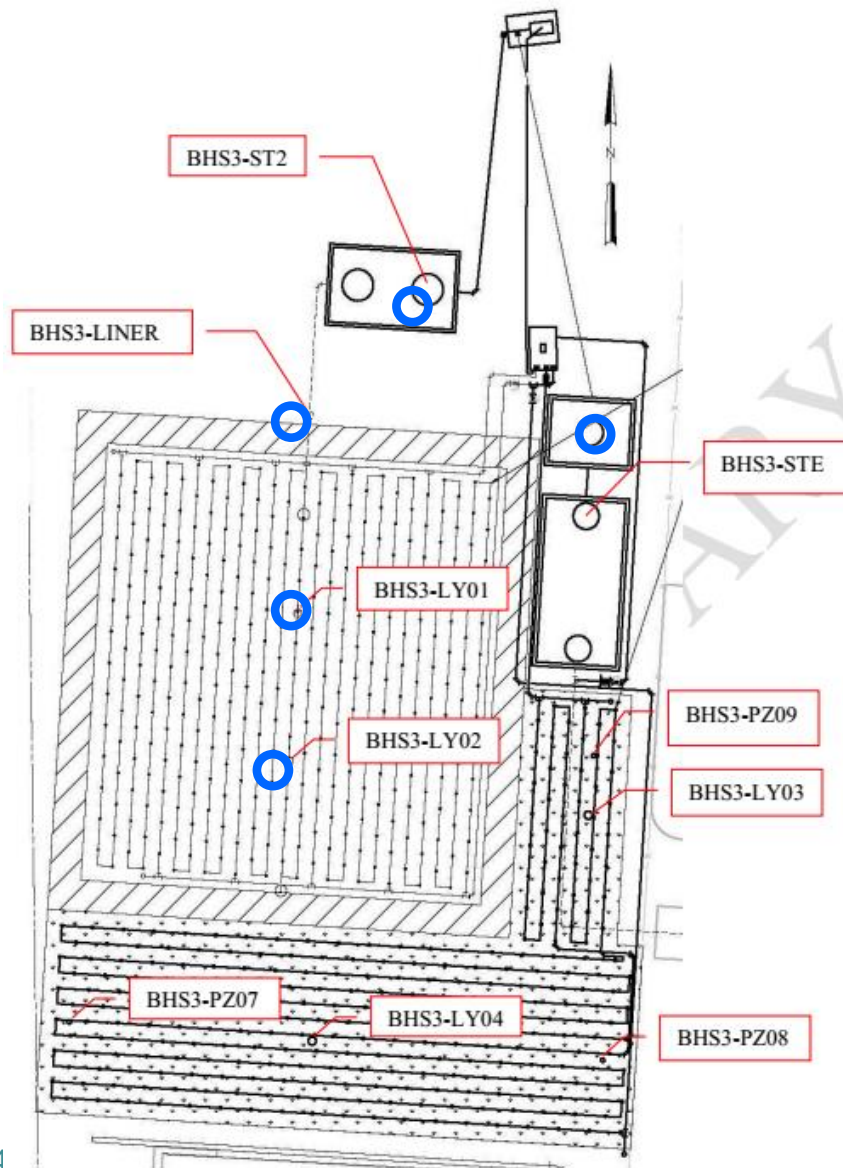


QAPP: Quality Assurance Project Plan

Continued Monitoring Time Line - Continued



Seminole County System B-HS3



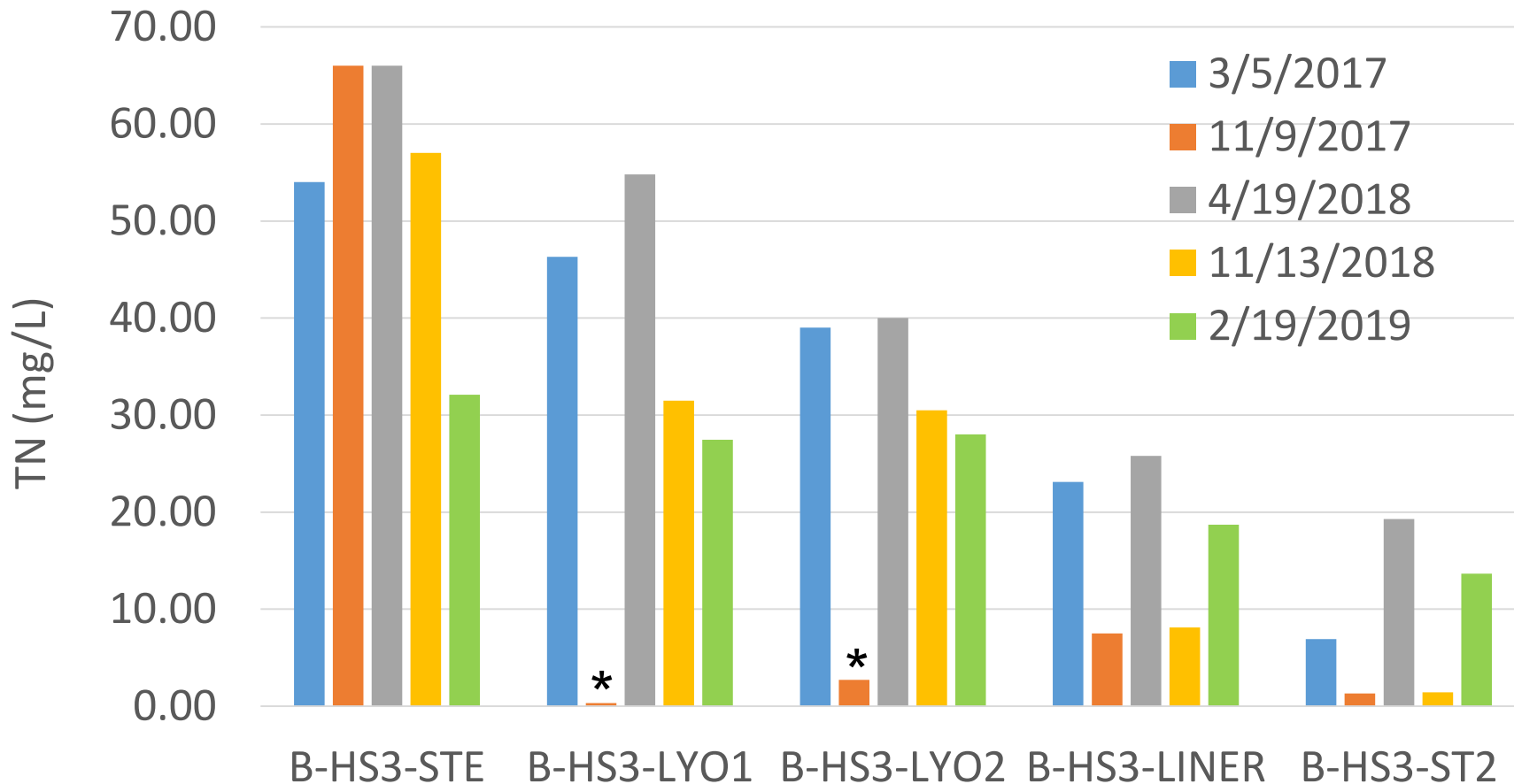
Samples were collected on 3/15/2017, 11/09/2017, and 4/19/2018 from:

- BHS3-STE (Septic/Pump tank)
- BHS3-LY01 (Bottom of stage 1 medium)
- BHS3-LY01 (Bottom of stage 1 medium)
- BHS3-LINER (Effluent from stage 2 medium)
- BHS3-ST2 (Sulfur tank)

Seminole County System B-HS3



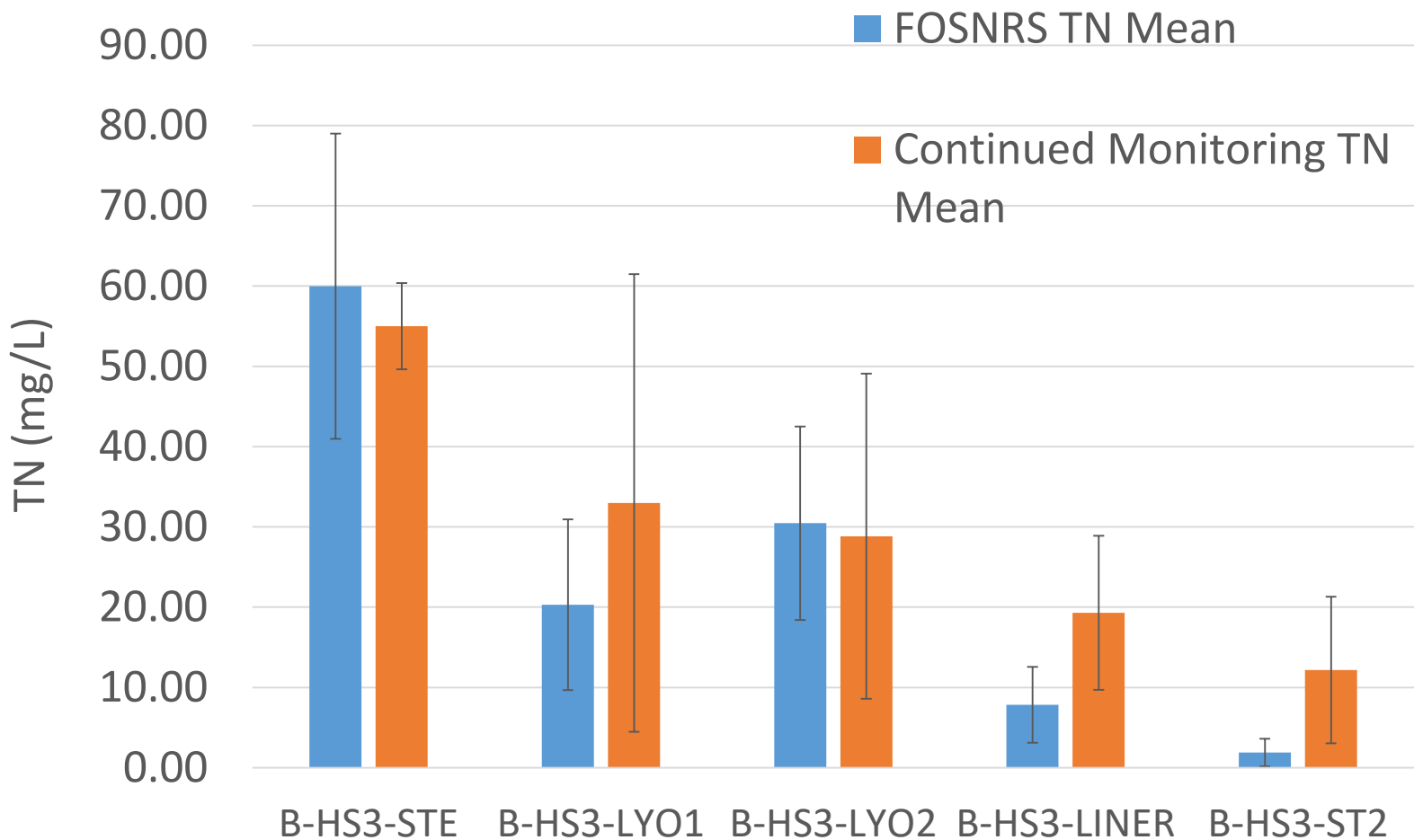
Seminole County System B-HS3



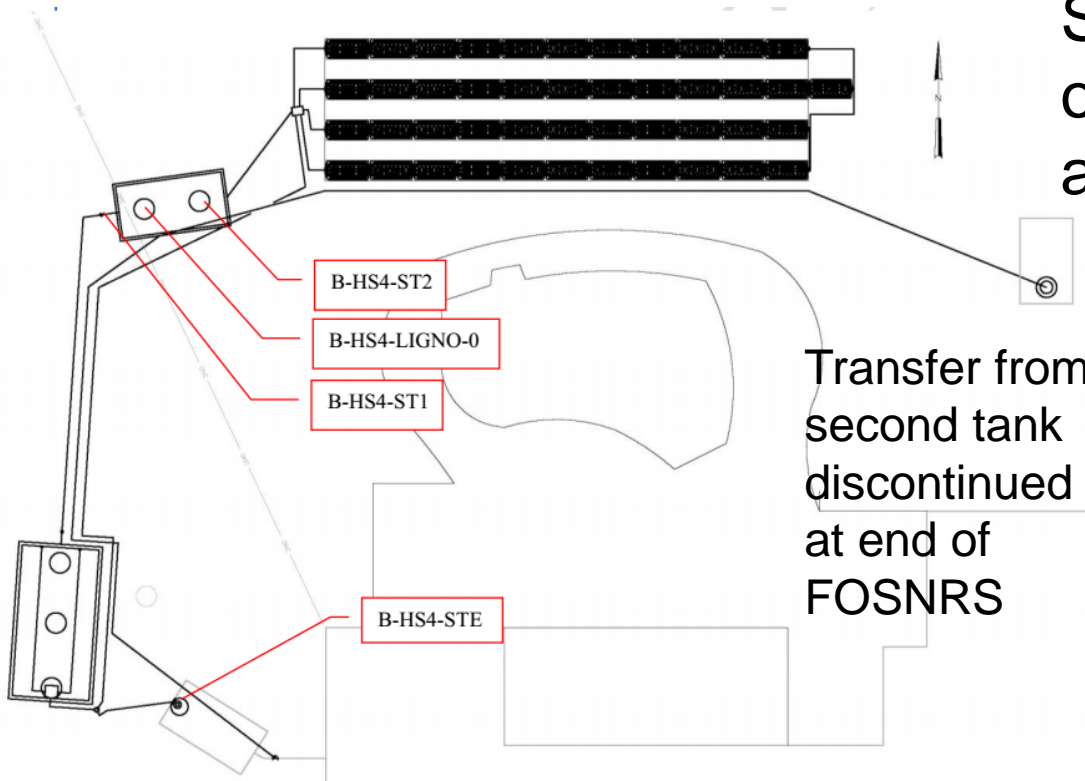
TN: Total Nitrogen

*: Not enough sample for nitrate/nitrite. Values represent sum of organic nitrogen and ammonia.

Seminole County System B-HS3 - Continued



Seminole County System B-HS4



Samples were collected on 3/16/2017, 11/08/2017, and 4/18/2018 from:

- a) BHS4-STE (Septic tank)
- b) BHS4-ST1 (Sampling port)
- c) BHS4-LINER-0 (Bottom of ligno layer)
- d) BHS4-ST2 (Sulfur tank)

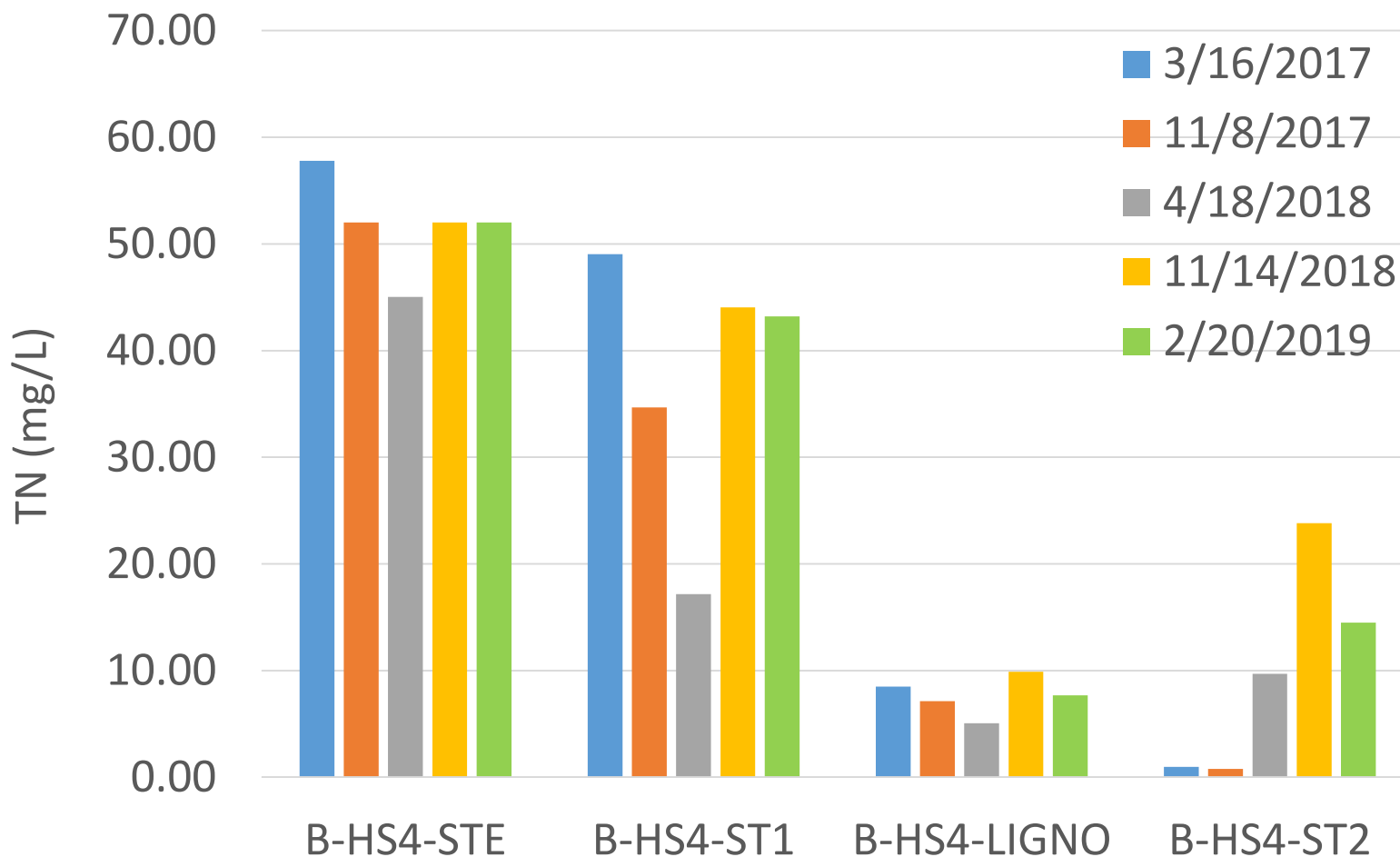
Seminole County System B-HS4 Stage Two Tank



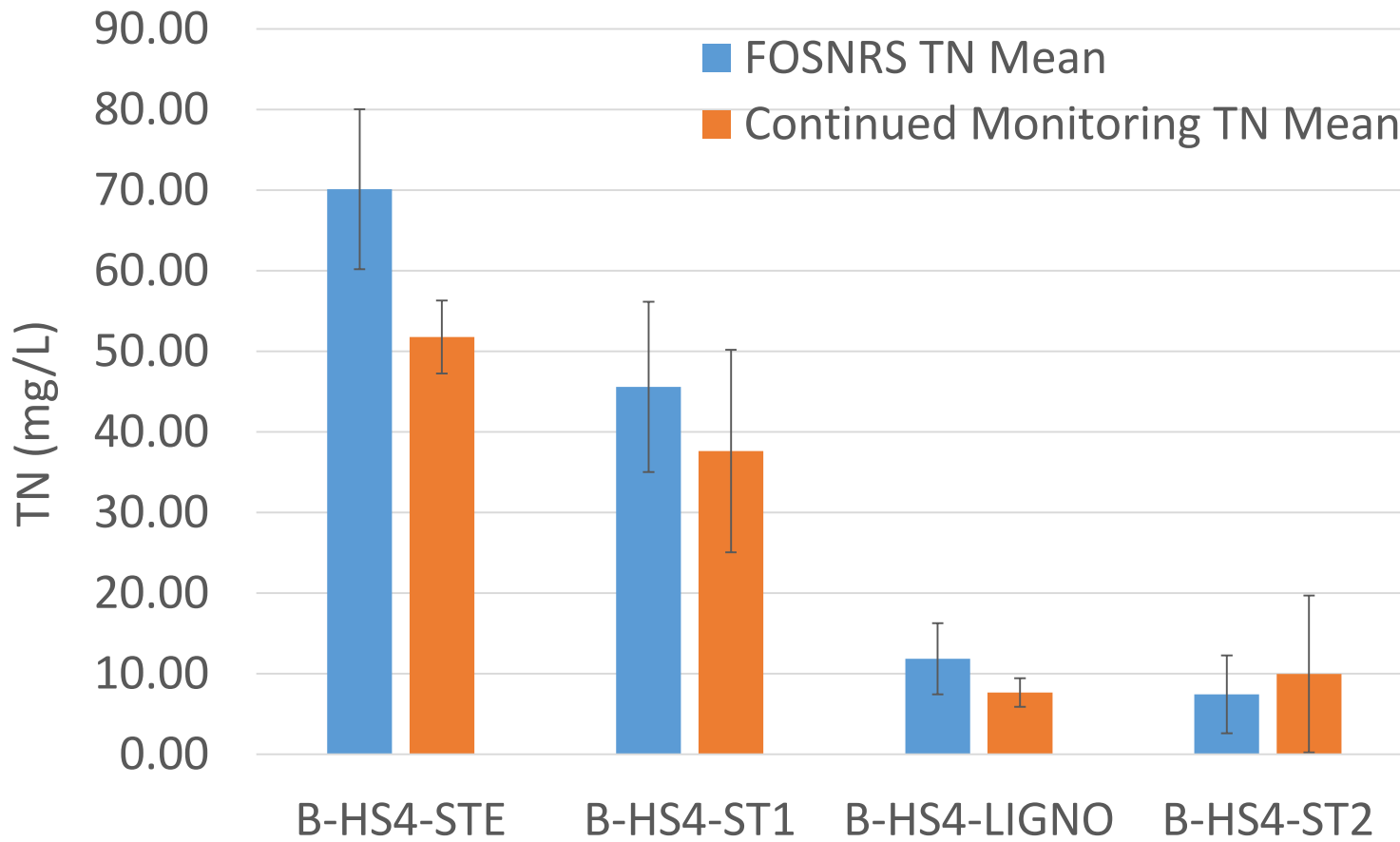


Seminole County System B-HS4 Stage One Tank

Seminole County System B-HS4



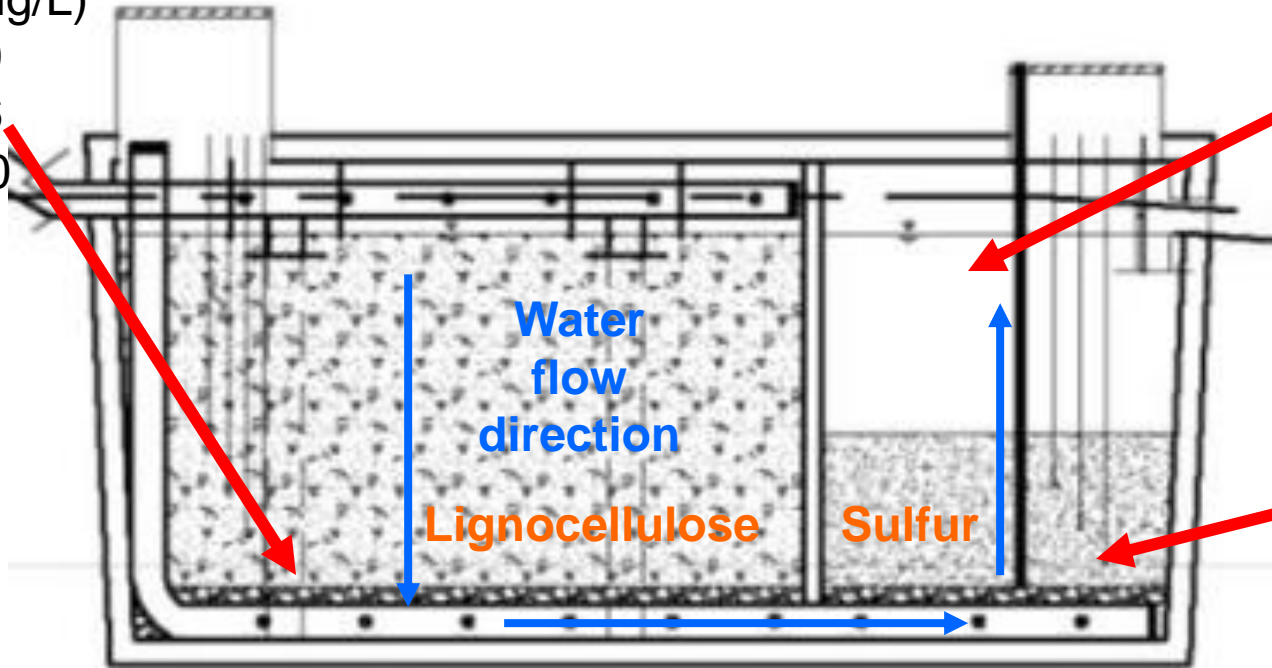
Seminole County System B-HS4 - Continued



Seminole County System B-HS4

11/14/2018 Profile Sampling TN Concentration

LIGNO (mg/L)
 TKN: 0.09
 NH4: 0.06
 NOX: 9.80
TN: 9.89



ST2 (mg/L)
 TKN: 0.83
 NH4: 0.36
 NOX: 23.00
TN: 23.83

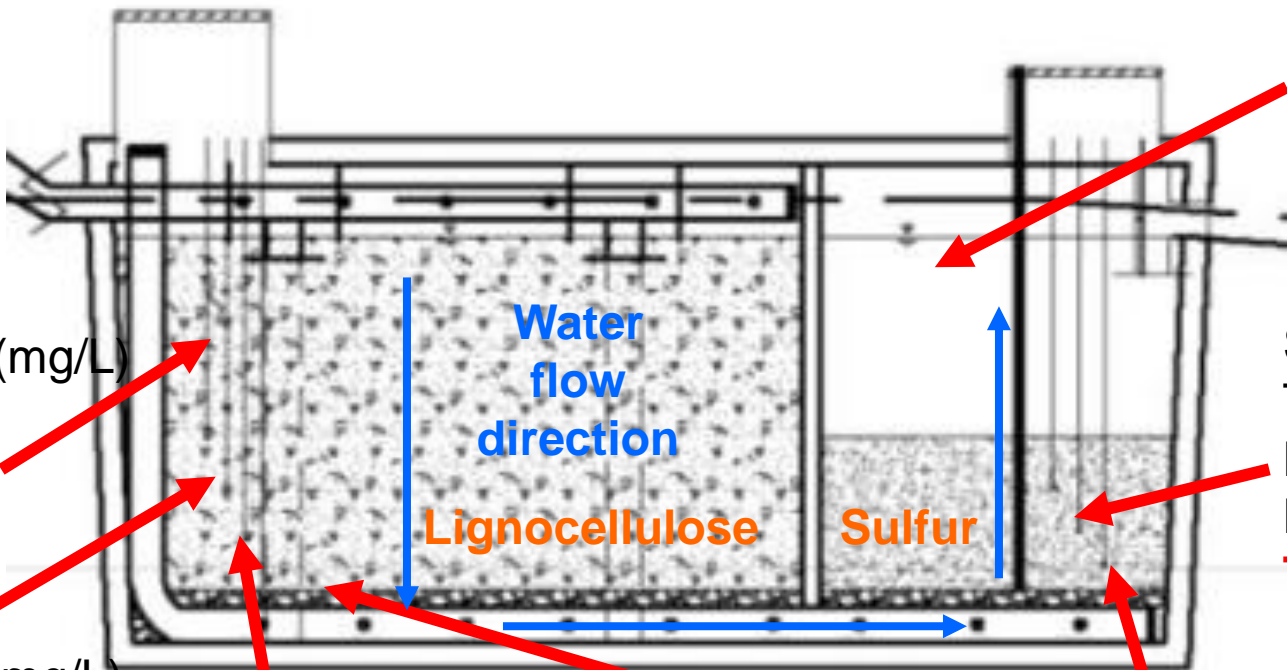
ST2-6 (mg/L)
 TKN: 0.55
 NH4: 2.0
 NOX: 0.12
TN: 0.67

TKN: Total Kjeldahl Nitrogen
 NH4: Ammonium
 NOX: Nitrate/Nitrite

LIGNO: bottom of the lignocellulosic layer
 ST2: top water in sulfur tank
 ST2-6: 6" above bottom of sulfur tank

Seminole County System B-HS4

2/20/2019 Profile Sampling TN Concentration



LIGNO-36 (mg/L)
 TKN: 7.9
 NH4: 8.1
 NOX: 31.2
TN: 39.1

LIGNO-24 (mg/L)
 TKN: 0.49
 NH4: 0.11
 NOX: 9.5
TN: 9.99

LIGNO-12 (mg/L)
 TKN: 0.51
 NH4: 0.04
 NOX: 6.2
TN: 6.71

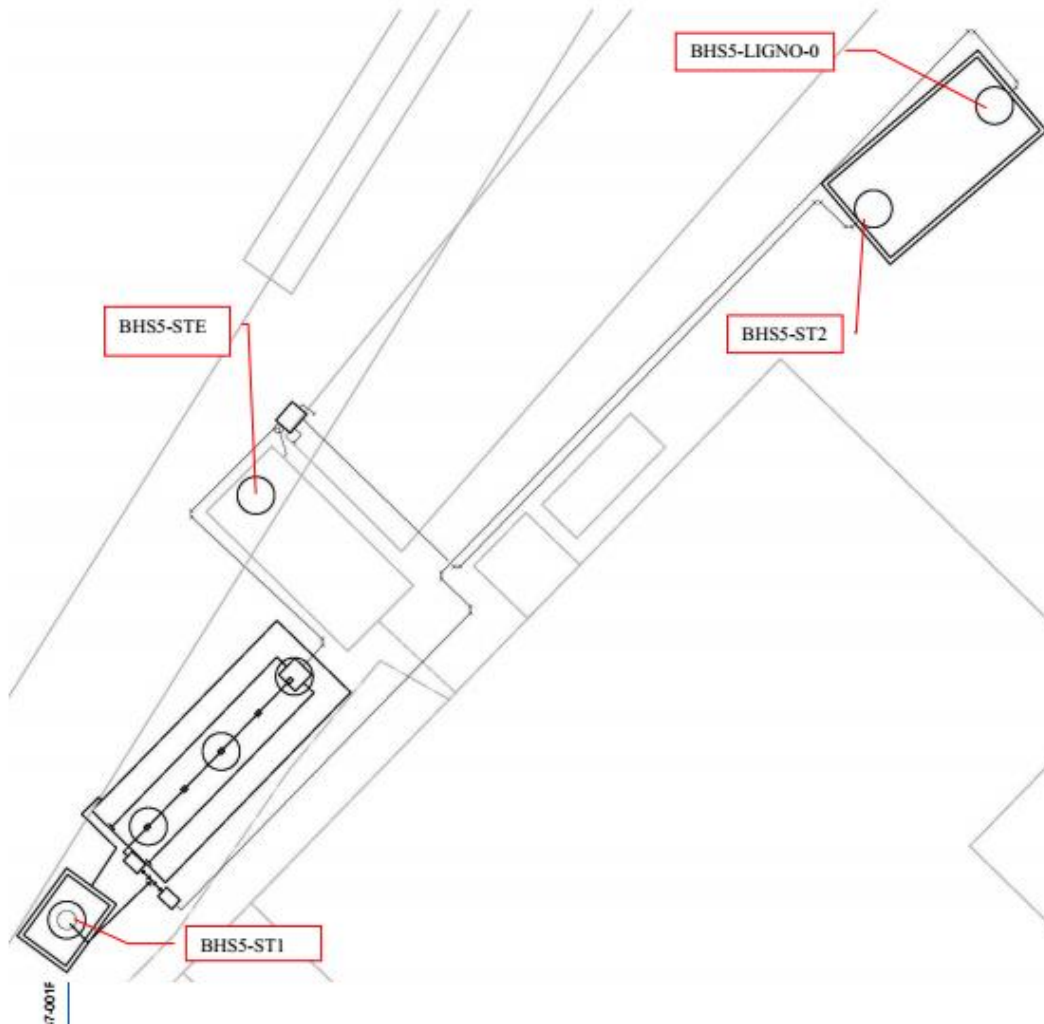
LIGNO (mg/L)
 TKN: 0.37
 NH4: 0.03
 NOX: 7.3
TN: 7.67

ST2 (mg/L)
 TKN: 2.5
 NH4: 0.93
 NOX: 12.00
TN: 14.5

ST2-12 (mg/L)
 TKN: 0.55
 NH4: 1.6
 NOX: 0.10
TN: 0.65

ST2-6 (mg/L)
 TKN: 0.89
 NH4: 0.80
 NOX: 0.10
TN: 0.99

Seminole County System B-HS5



Samples were collected on 3/16/2017, 11/07/2017, and 4/18/2018 from:

- BHS4-STE (Septic tank)
- BHS4-ST1 (Pump tank)
- BHS4-LINER-0 (Bottom of ligno layer)
- BHS4-ST2 (Sulfur tank)

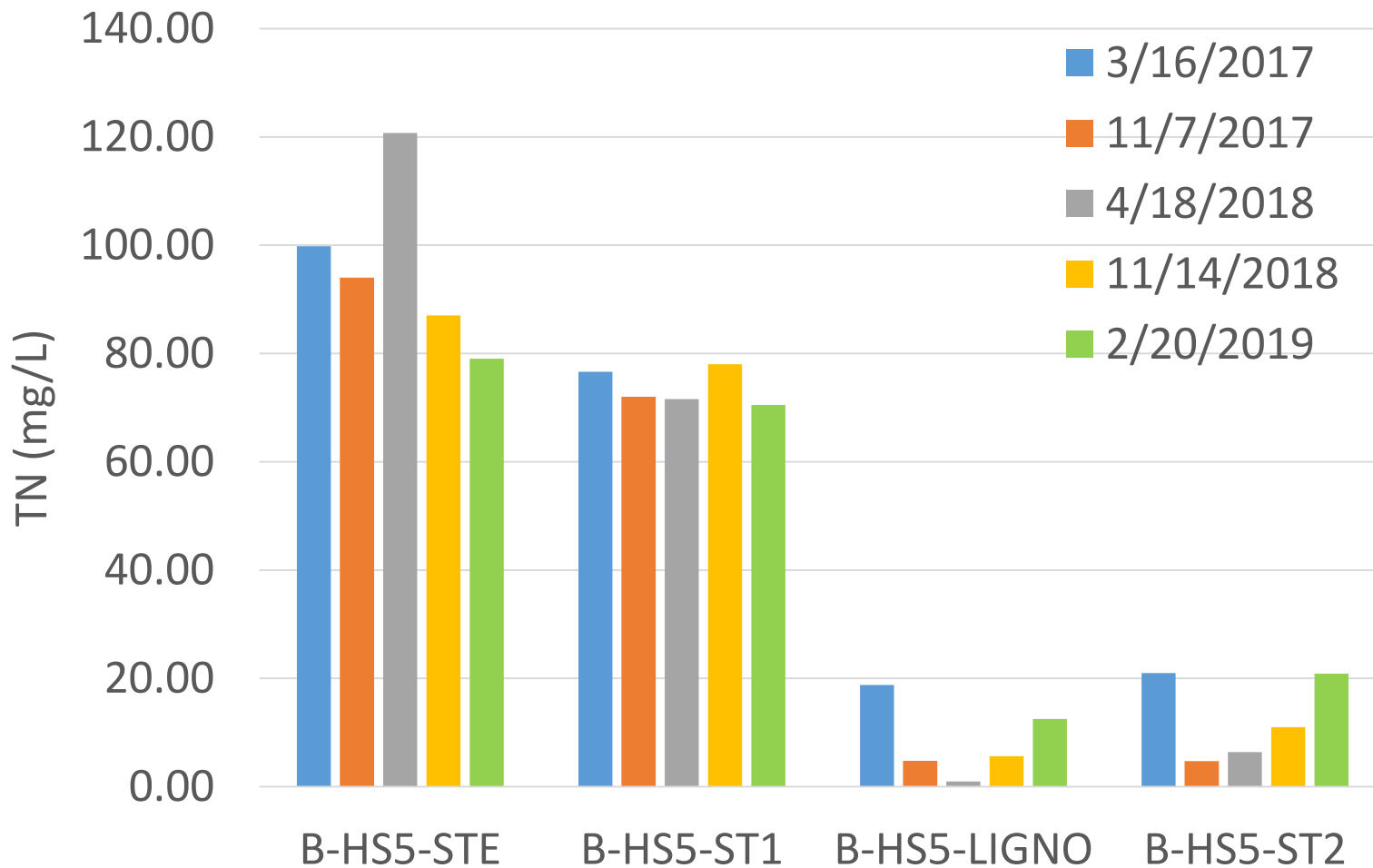
Seminole County System B-HS5



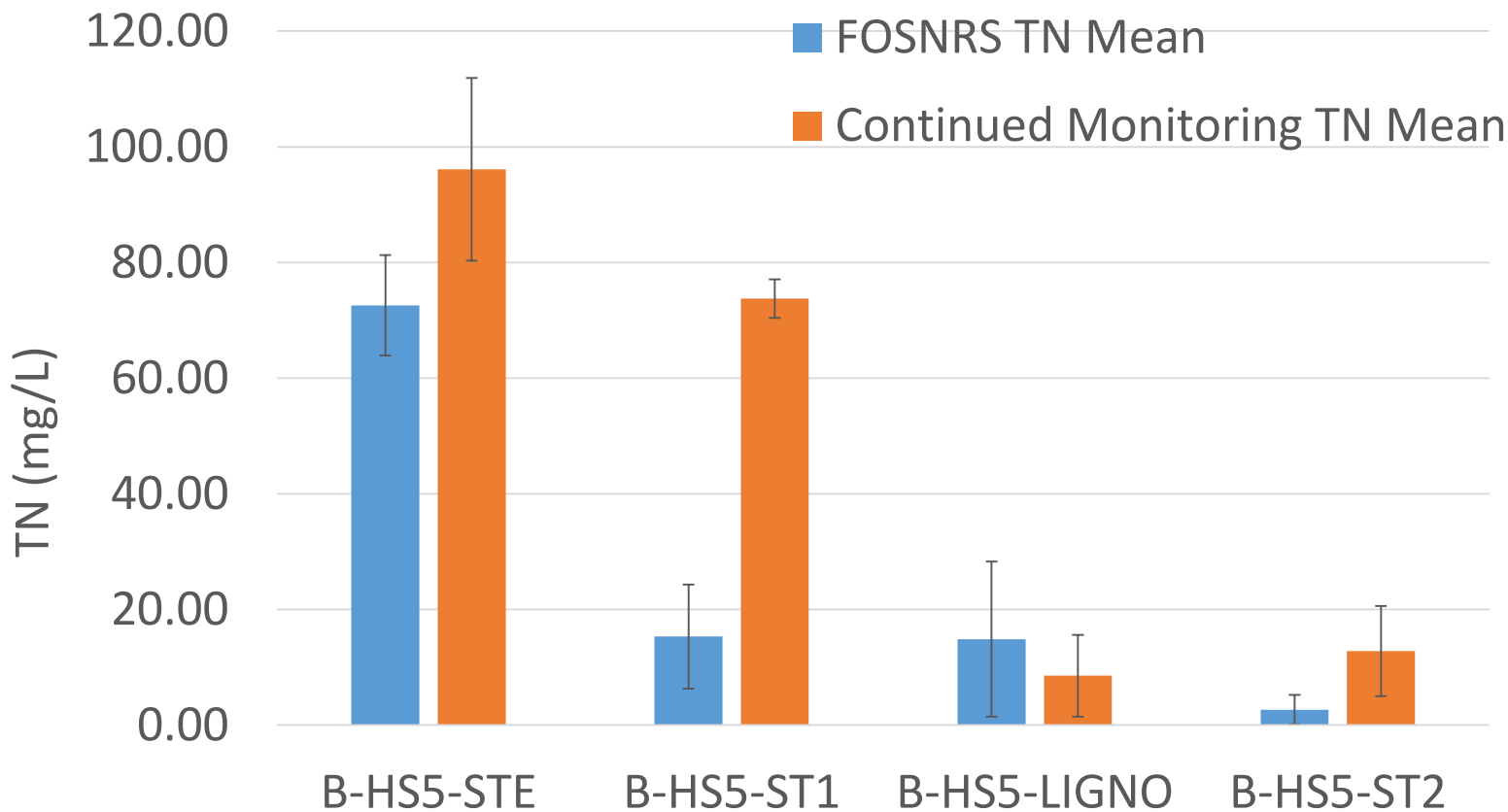


Seminole County System B- HS5

Seminole County System B-HS5



Seminole County System B-HS5 - Continued



Seminole County System B-HS5

11/14/2018 Profile Sampling TN Concentration

ST1 (Stage 1 media) (mg/L)

TKN: 35.00

NH4: 25.00

NOX: 43.00

TN: 78.00

ST2 (mg/L)

TKN: 11.00

NH4: 11.00

NOX: 0.02

TN: 11.02

LIGNO (mg/L)

TKN: 5.4

NH4: 5.4

NOX: 0.23

TN: 5.63

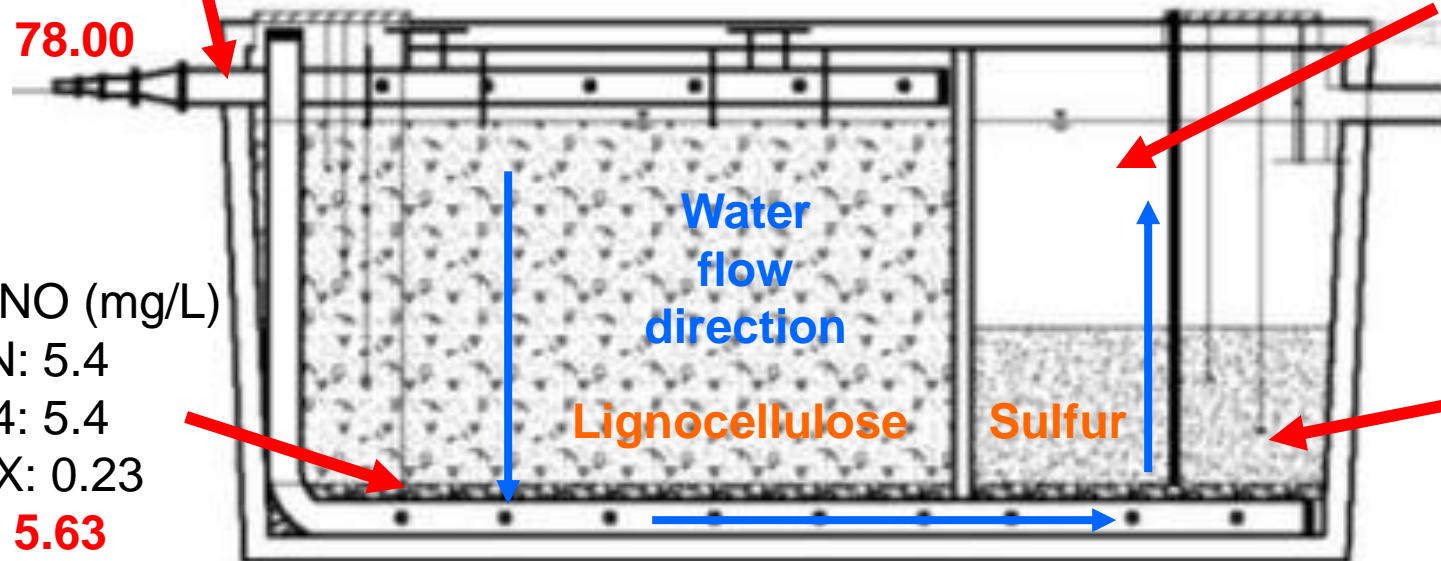
ST2-6 (mg/L)

TKN: 3.0

NH4: 4.7

NOX: 0.02

TN: 3.02



LIGNO: bottom of the lignocellulosic layer

ST2: top water in sulfur tank

ST2-6: 6" above bottom of sulfur tank

Seminole County System B-HS5

2/20/2019 Profile Sampling TN Concentration

ST1 (Stage 1 media) (mg/L)

TKN: 4.50
 NH4: 5.20
 NOX: 66.00
TN: 70.50

ST2 (mg/L)

TKN: 5.90
 NH4: 5.30
 NOX: 15.00
TN: 20.90

LIGNO-36 (mg/L)

TKN: 0.39
 NH4: 0.03
 NOX: 46.00
TN: 46.39

ST2-12 (mg/L)

TKN: 3.60
 NH4: 2.30
 NOX: 0.10
TN: 3.70

LIGNO-24 (mg/L)

TKN: 3.80
 NH4: 3.3
 NOX: 23.00
TN: 26.80

LIGNO-12 (mg/L)

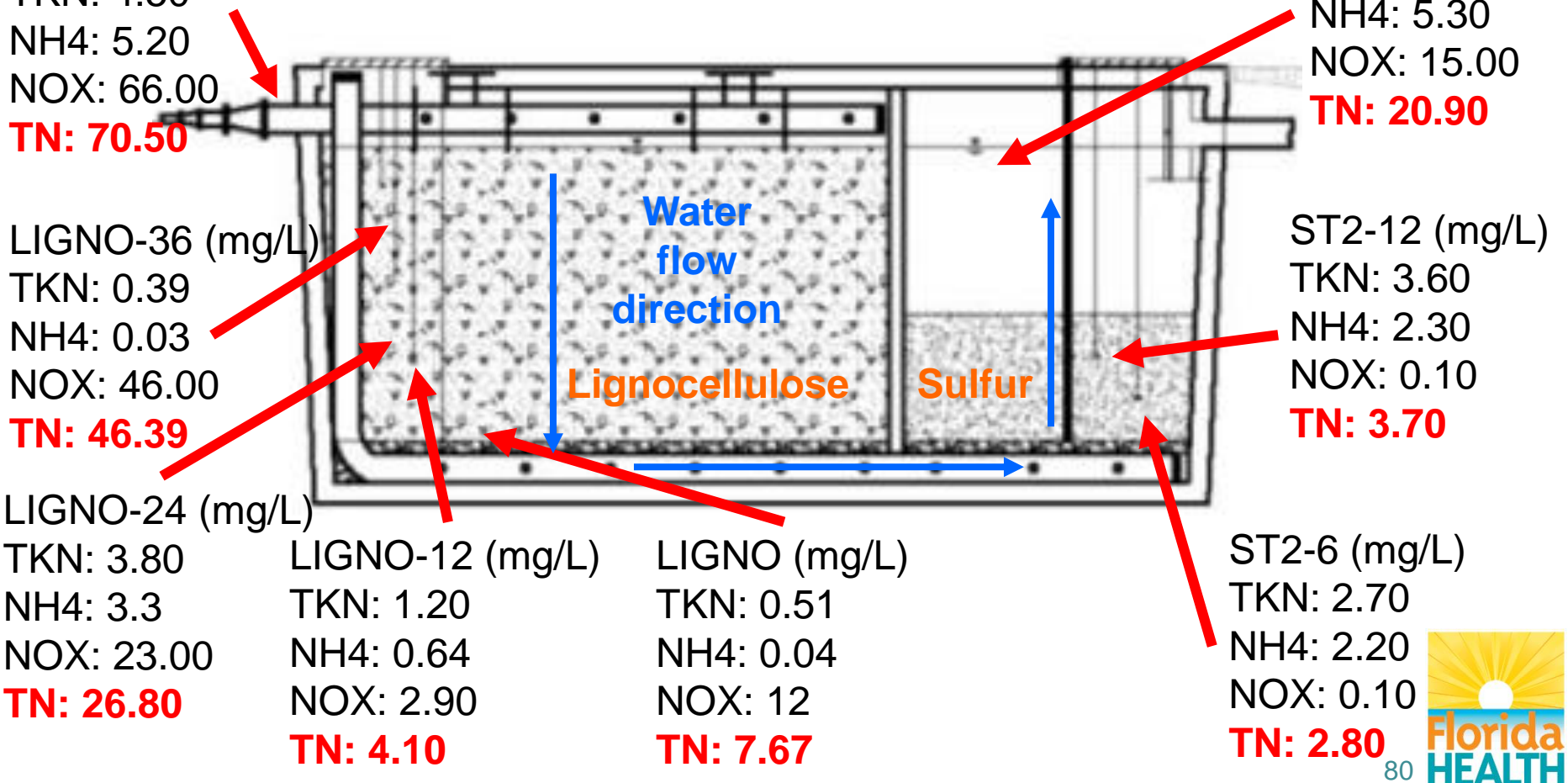
TKN: 1.20
 NH4: 0.64
 NOX: 2.90
TN: 4.10

LIGNO (mg/L)

TKN: 0.51
 NH4: 0.04
 NOX: 12
TN: 7.67

ST2-6 (mg/L)

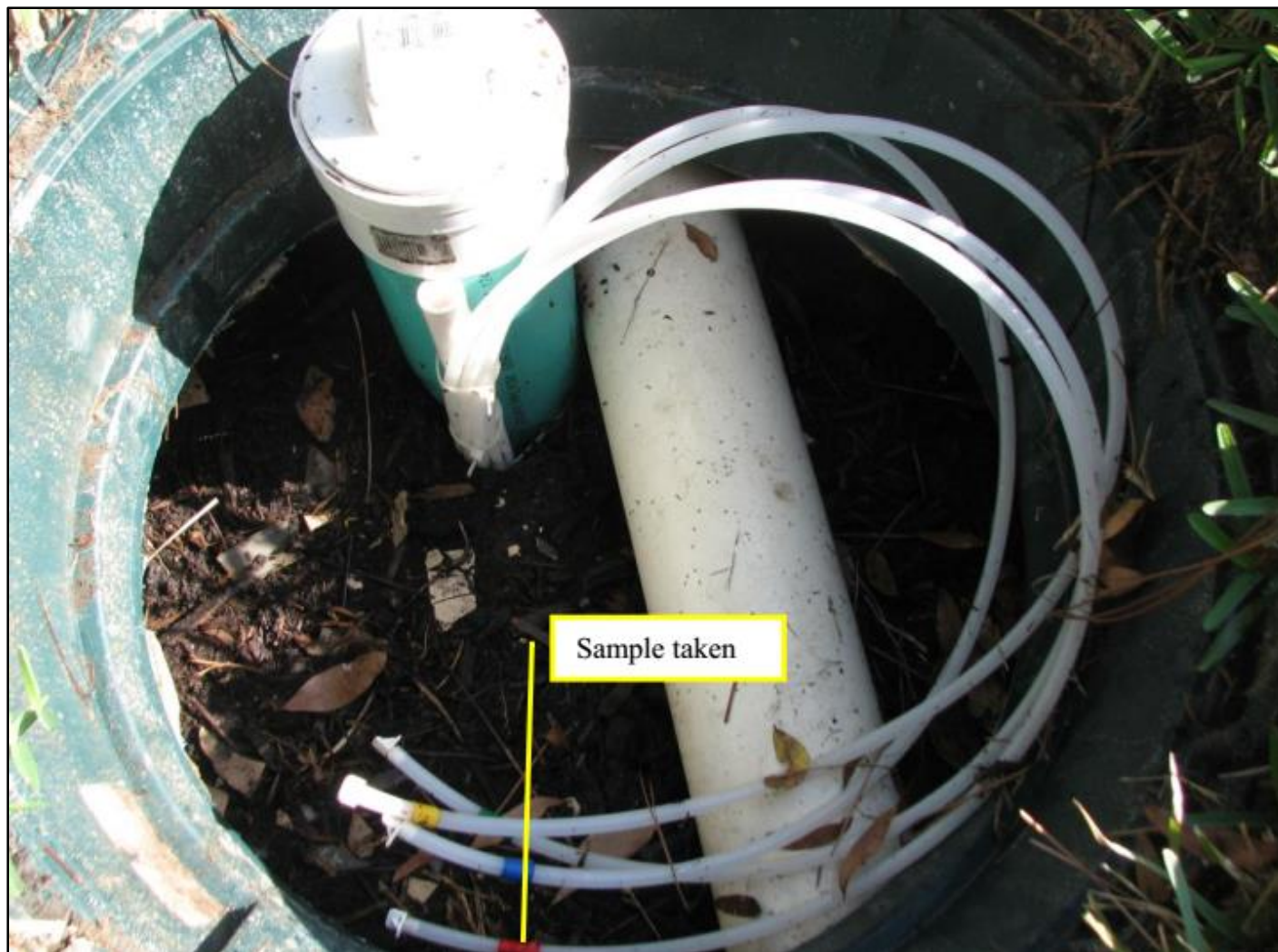
TKN: 2.70
 NH4: 2.20
 NOX: 0.10
TN: 2.80



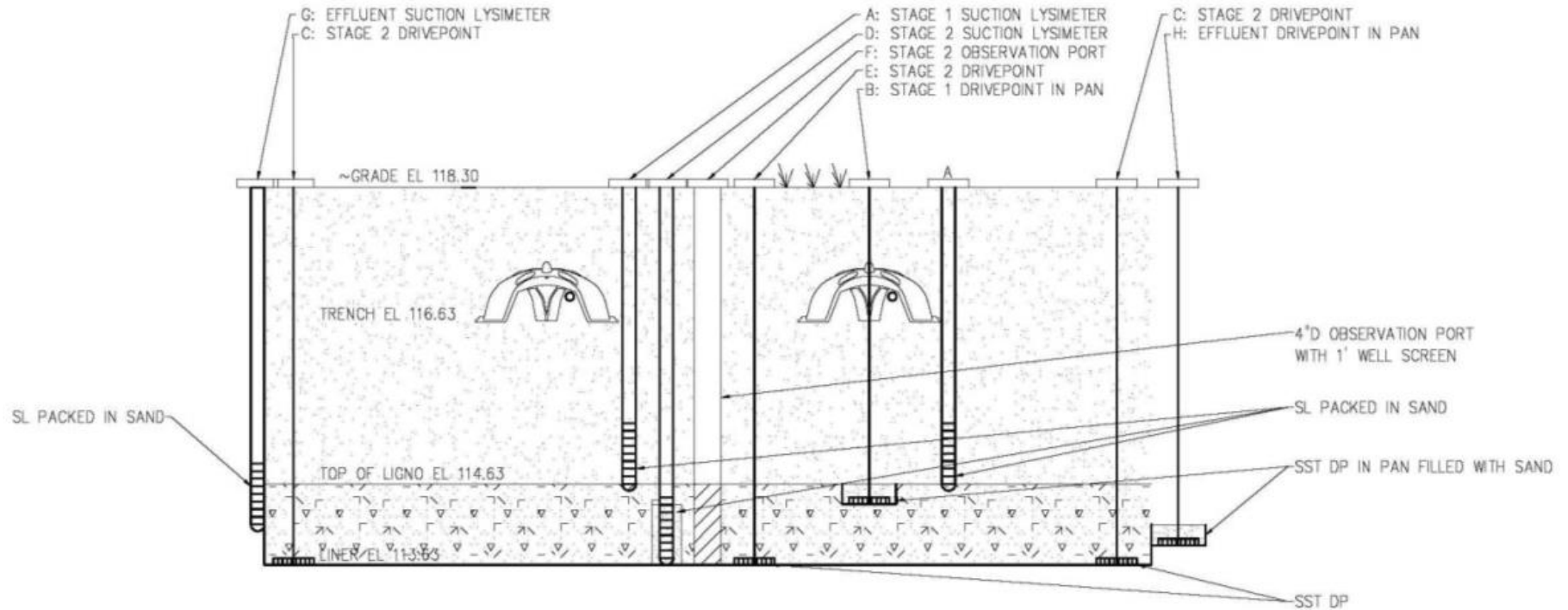
Marion County System B-HS5 Lignocellulose Tank on 2/20/2019



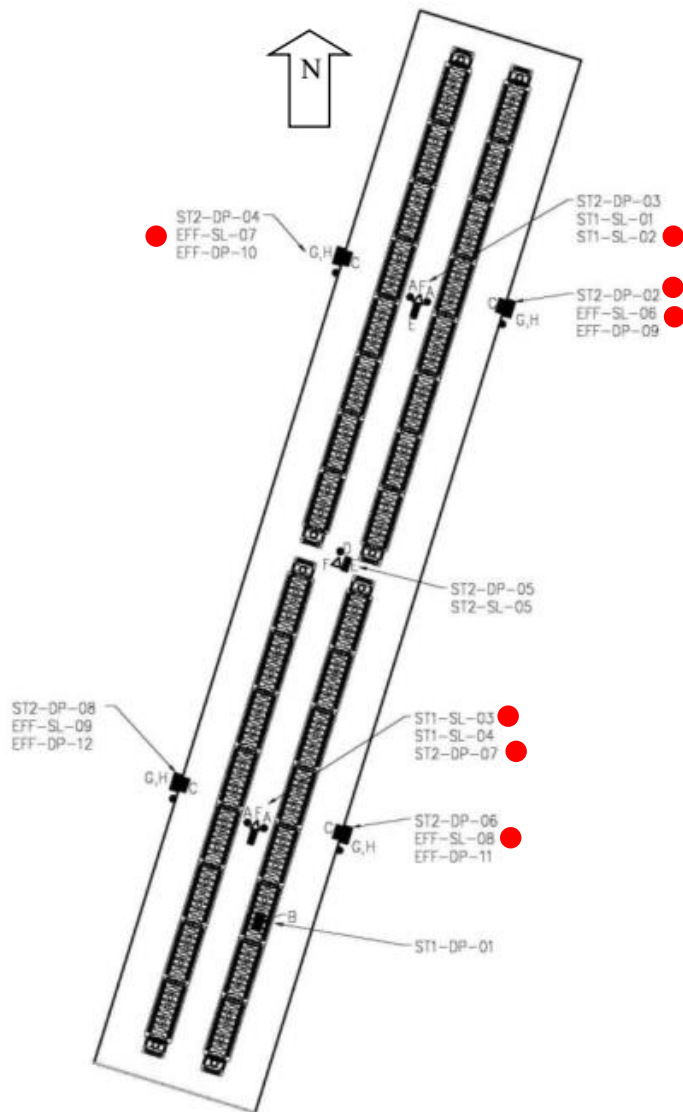
Marion County System B-HS5 Lignocellulose Tank In June 2013



Marion County System B-HS7 Drainfield Cross Section



Marion County System B-HS7



Samples were collected on 4/26/2017, 12/05/2017, and 4/26/2018 from:

- BHS7-Pump (Pump tank)
- BHS7-ST1-SL-02 (Stage 1 media)
- BHS7-ST1-SL-03 (Stage 1 media)
- BHS7-ST2-DP-02 (Stage 2 media)
- BHS7-ST2-DP-07 (Stage 2 media)
- BHS7-EFF-SL-06 (Peripheral soil)
- BHS7-EFF-SL-07 (Peripheral soil)
- BHS7-EFF-SL-08 (Peripheral soil)

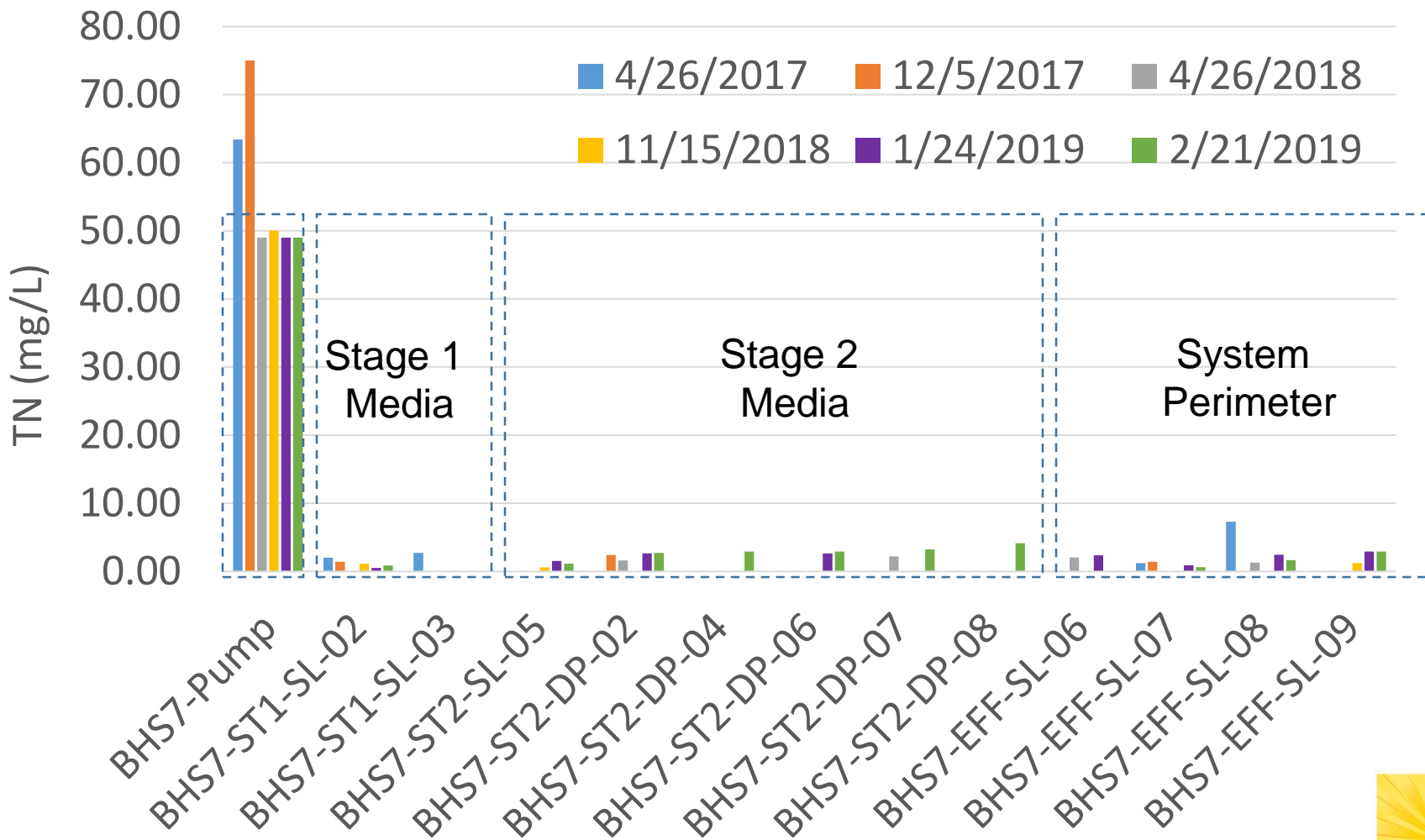
Marion County System B-HS7



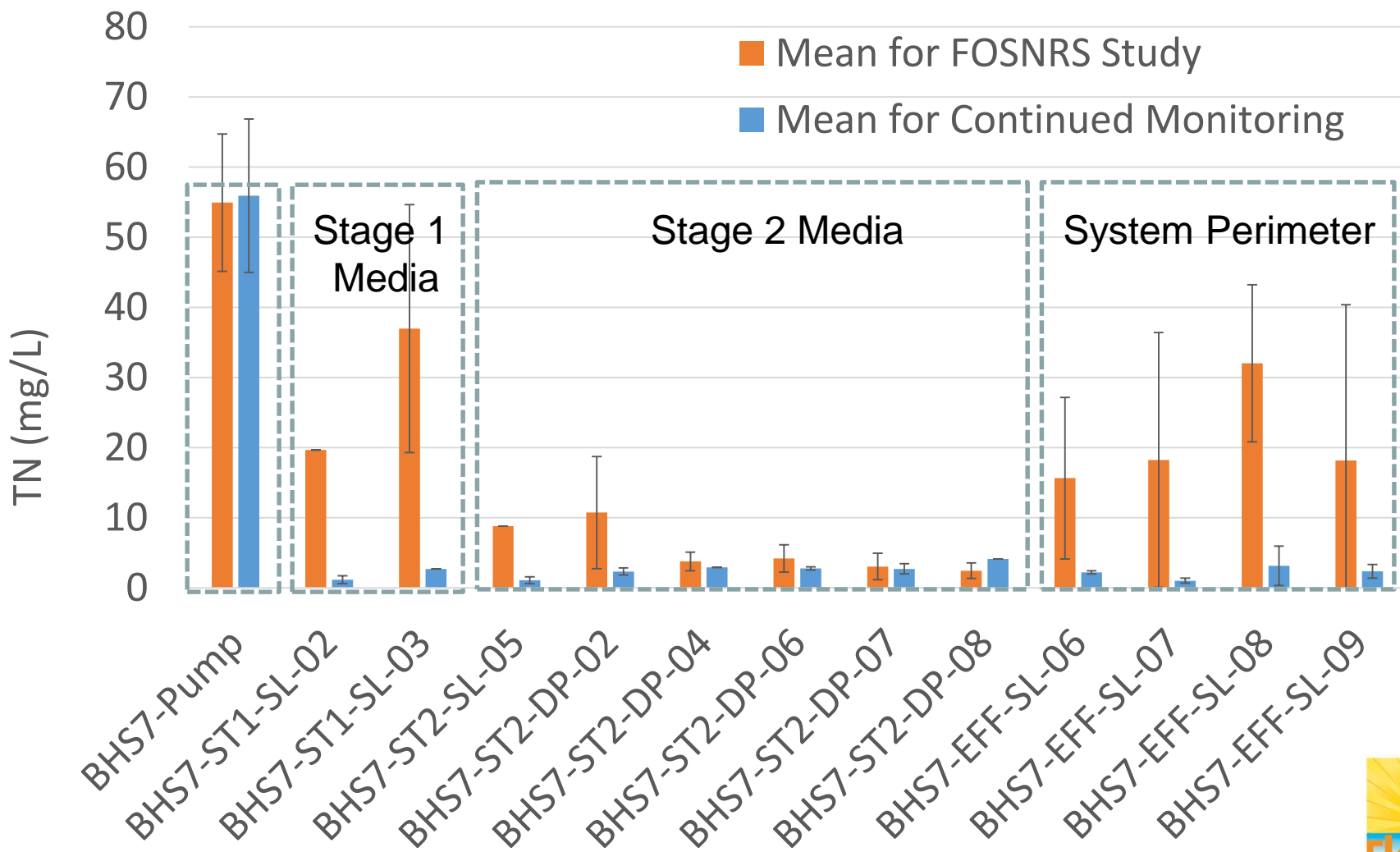
Marion County System B-HS7 Drainfield



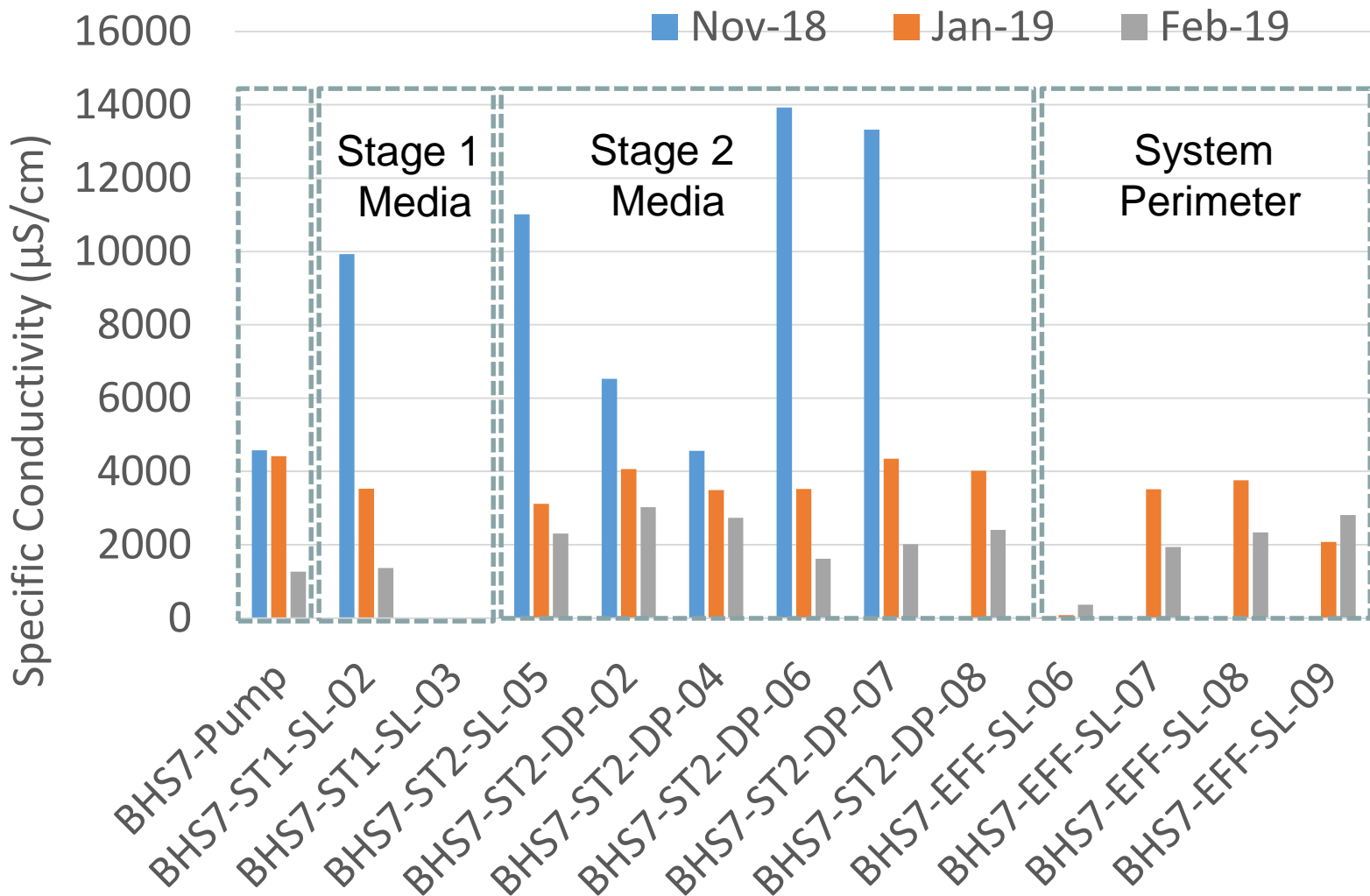
B-HS7 TN Concentration



B-HS7 TN Concentration - Continued



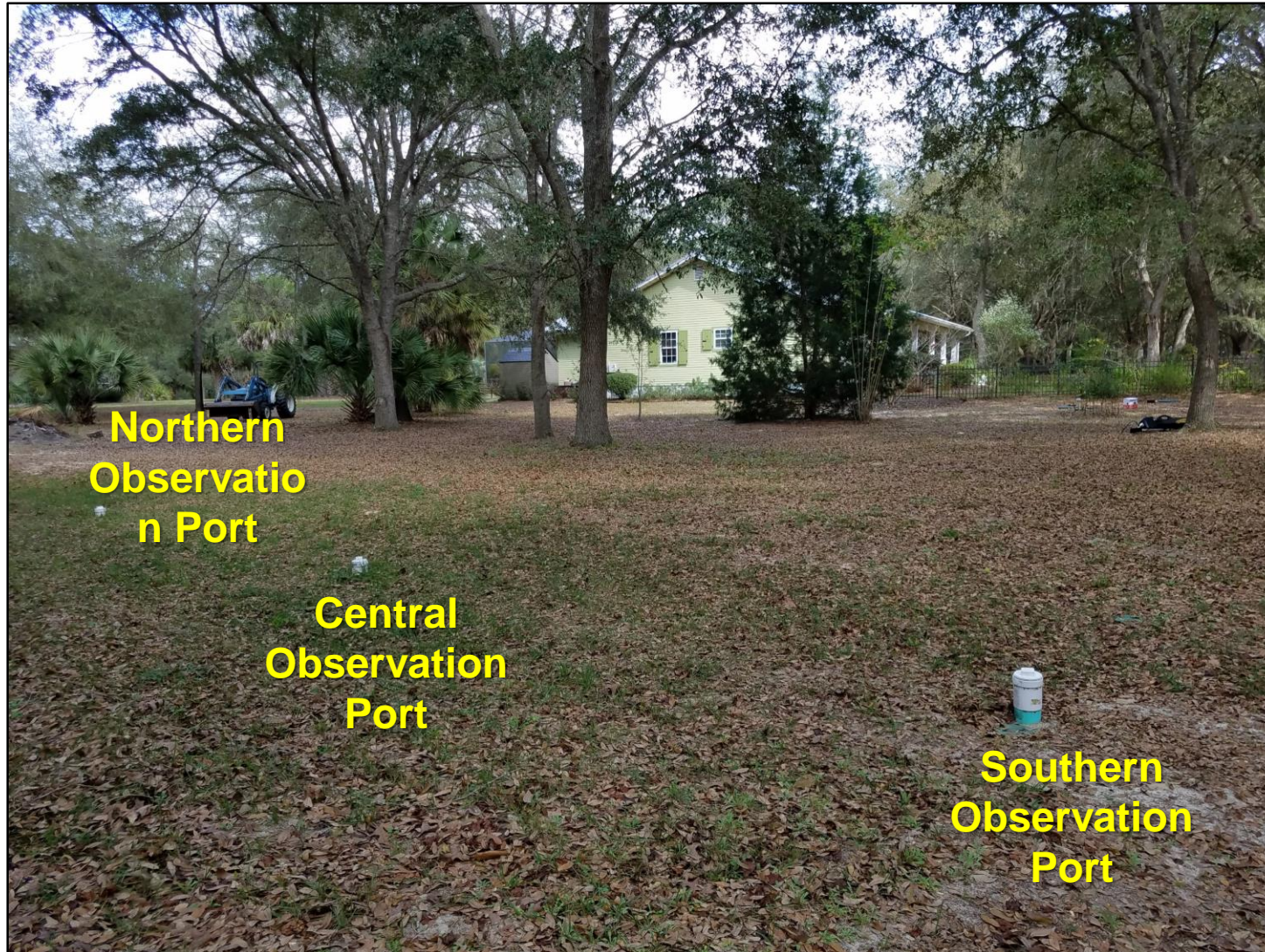
B-HS7 – Specific Conductivity



Marion County System B-HS7 - Continued



Marion County System B-HS7 - Continued



Northern
Observation
Port

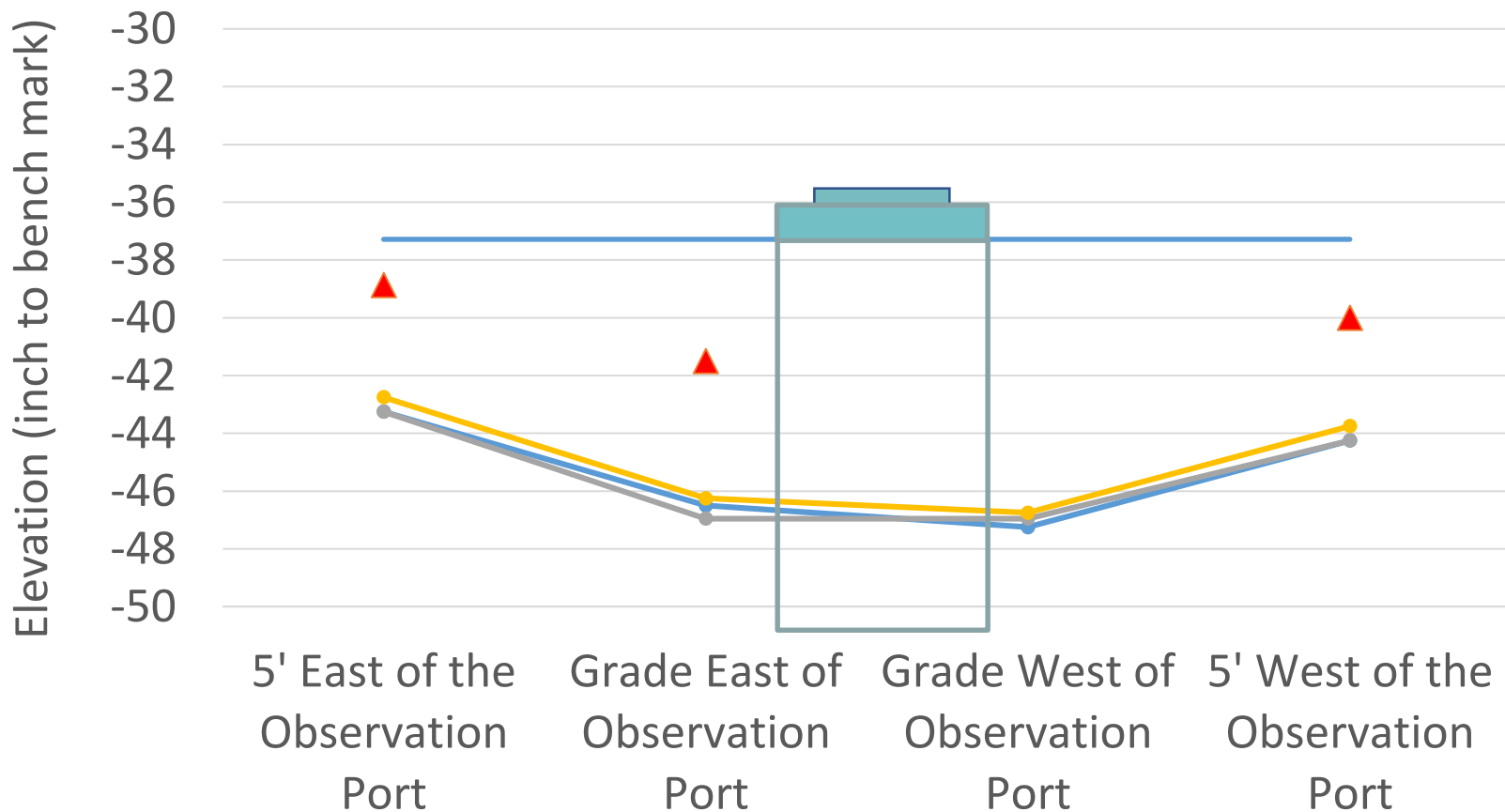
Central
Observation
Port

Southern
Observation
Port

B-HS7 Drainfield

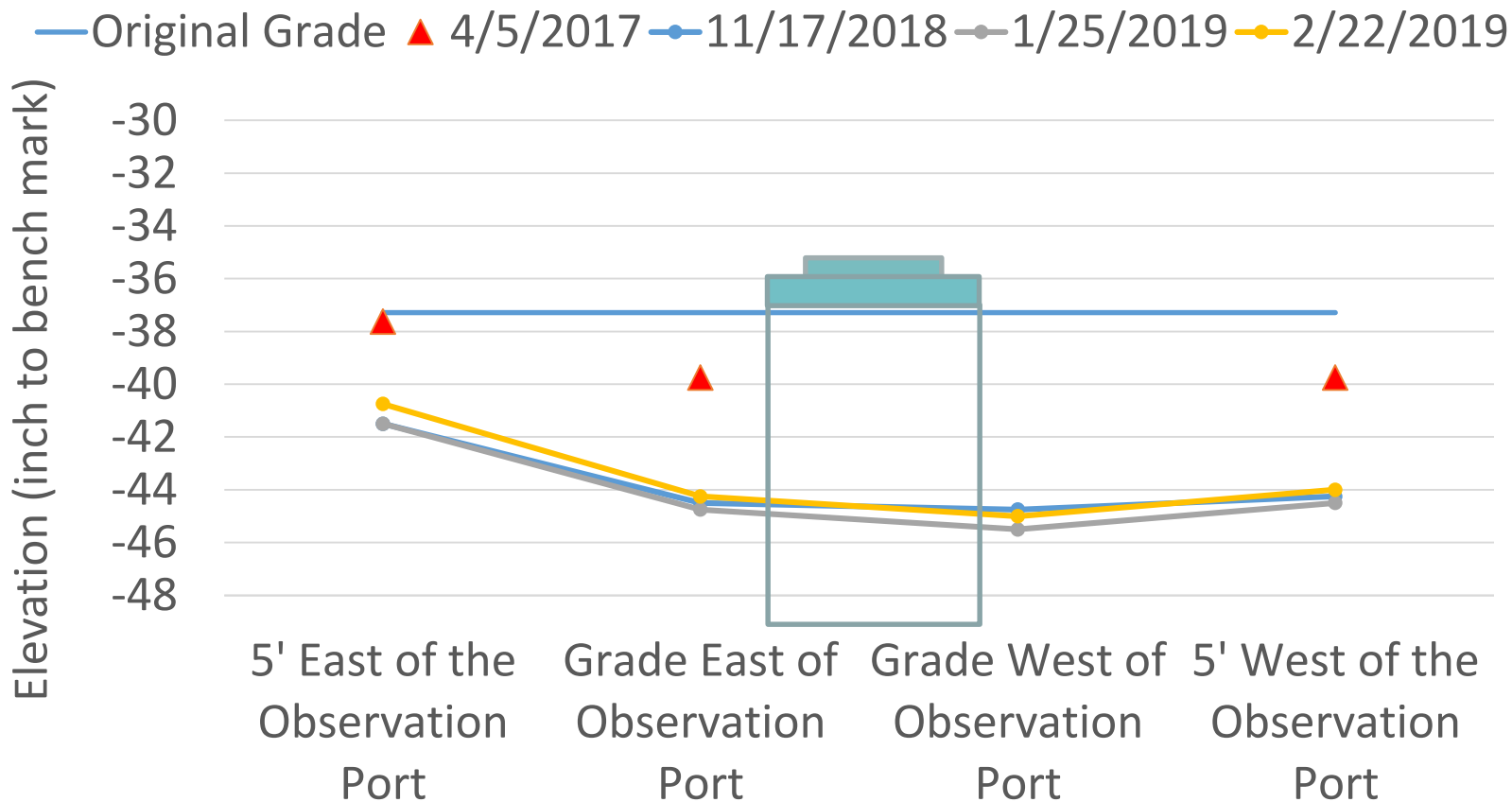
Southern Observation Port Cross Section

— Original Grade ▲ 4/5/2017 ● 11/17/2018 ● 1/25/2019 ● 2/22/2019



B-HS7 Drainfield

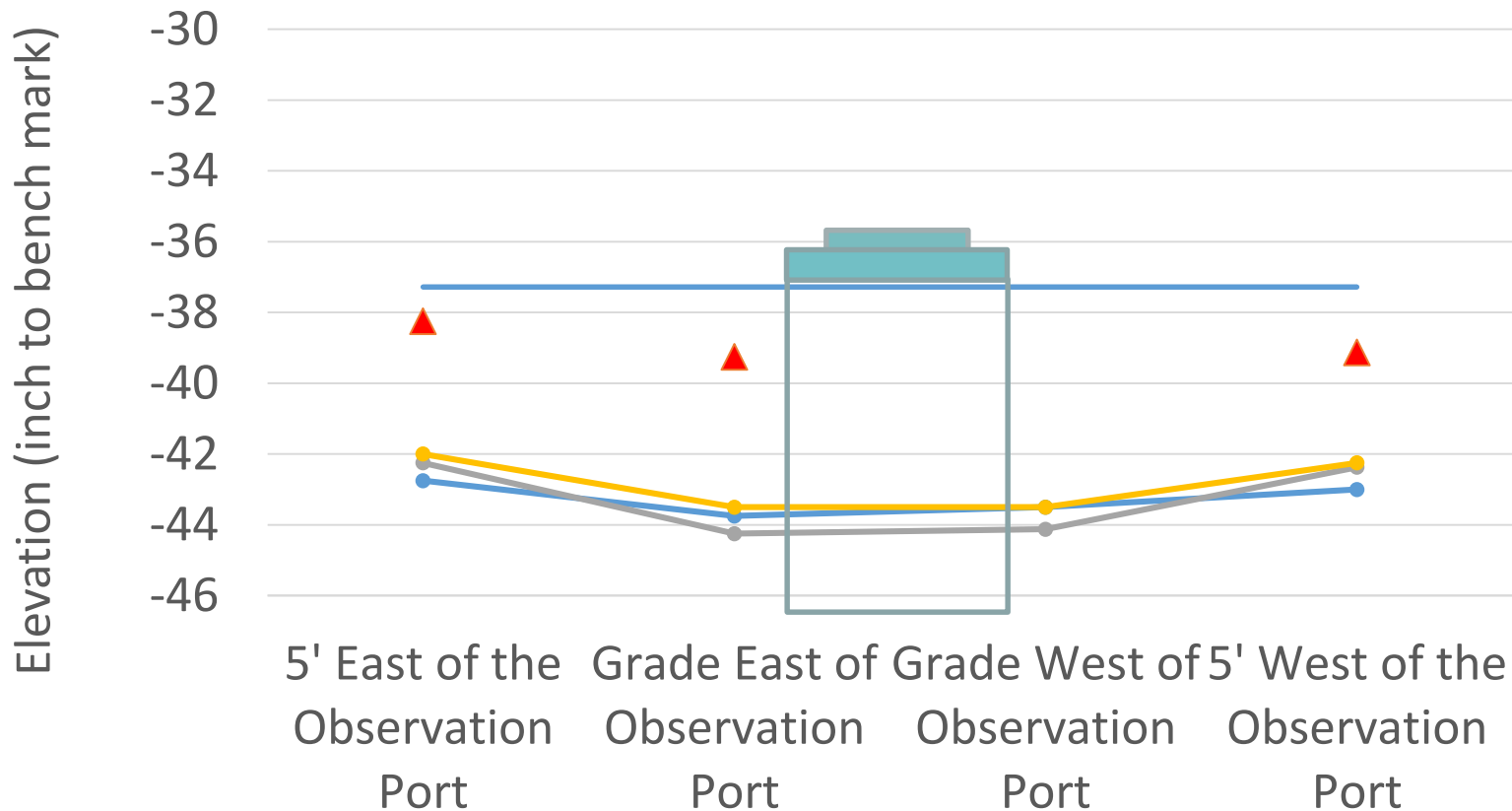
Central Observation Port Cross Section



B-HS7 Drainfield

Northern Observation Port Cross Section

— Original Grade ▲ 4/5/2017 ● 11/17/2018 ● 1/25/2019 ● 2/22/2019



Public Comment

Closing Comments, Next Meeting, and Adjournment

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